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CORNELL UNIVERSITY.

COURSES OF STUDY

FOR

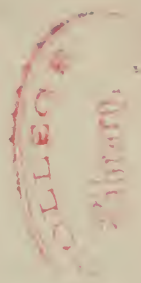
GRADUATE STUDENTS

FOR THE

ACADEMIC YEAR,

1888-89.

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COURSES OF STUDY FOR GRADUATE STUDENTS.

GENERAL STATEMENT.

In Cornell University the work of the Junior and Senior years in all the non-technical courses is mainly elective. The courses open for election by students are numerous, and offer opportunities for advanced study, extending far beyond the limit of the later years of a college course. The completion of a certain specified amount of such elective work is recognized on the part of the University, by the conferring of a degree; but so far as relates to admission to classes and to the prosecution of studies, no distinction is made between students who have taken a bachelor's degree, and those who are candidates for that degree. Certain courses, especially seminary courses, are arranged for students who have had a large amount of preliminary training, and are ordinarily taken by graduate students only.

In May of each academic year, the Faculty issue an Announcement of the Courses of Instruction for the following year. This Announcement can be procured on application to the Registrar. From this a person intending to take a course of graduate study can learn definitely as to all the courses of instruction that will be offered in the University. The Announcement generally indicates the class of students for which each course is intended, and the conditions on which it is open to them. The course numbers in the following pages refer to the latest Announcement, that printed in the University Register for the year 1887-88.

Instruction is given mainly by lectures, and by means of special investigations carried on in seminary rooms and laboratories. The equipment in respect to the two latter methods of instruction will be found described under the head of "Material Equipment" below.

Students purposing to take graduate work in the University should read carefully the following pages, and should also procure a copy of the University Register, and familiarize themselves with its contents. It is often advisable, after this has been done, to correspond with the Professors in charge of the departments in which they intend to work.

CHOICE AND DIRECTION OF STUDIES.

All graduate students, both those who are candidates for a degree, and those who are not, are required to work under the general direction of a Committee of the Faculty, appointed for the special purpose of supervising and directing their work. Students are re-

quired to send to the Faculty a written statement of the branches of study they desire to pursue, at the beginning of the year. The Faculty appoints a special committee for each individual student, who confer with the student, ascertain his attainments and purposes, and either approve of the courses he has selected, and direct him how to pursue them advantageously, or else suggest such changes as seem to them desirable. The entire direction of the work of the student is thereafter in the hands of the special committee. In the case of students who are candidates for an advanced degree, the Faculty will determine upon what conditions the degree may be conferred, taking into account the attainments of the student in the department in which he seeks the degree. This plan of supervision is intended to secure the two-fold advantage of encouraging regularity of work, and of securing to the student frequent opportunities for consultation with those members of the Faculty most interested in the studies he is pursuing.

ANCIENT LANGUAGES.

The range of study provided for by the University covers a generous amount of reading in the Greek and Roman literatures, the study of the political and social history of Greece and Rome, in regular courses, and in connection with the literatures, the study of private life in Greece and Italy, with abundant illustrations from the material remains of Greek and Roman civilization, the study of the political and legal institutions of Athens and Sparta, the introductory study of the art of Greece and Rome, the study of the languages on the side of forms and on the side of syntax, and the special training of teachers.

The courses of instruction are as follows :

I. READING OF AUTHORS.

Greek. 2. Plato's *Apology of Socrates*, and *Crito*. Twelve books of Homer. The *Persians*, *Prometheus*, and *Seven against Thebes* of Aeschylus. Greek composition, based on Plato, throughout the year. Lectures on methods and ideals of classical study. Professor FLAGG.

Greek. 3 (A). Herodotus and Thucydides. The *Ajax* of Sophocles. Theocritus. Professor FLAGG.

Greek. 3 (B). *Lysias* and Demosthenes. The *Oedipus Rex* of Sophocles. The *Archanians* of Aristophanes. Professor FLAGG.

Greek. 3 (C). Plato. Three plays of Euripides. The mode of instruction employed in the three last mentioned courses is a combination of the "recitation" and "seminary" methods. Professor FLAGG.

Greek. 4 (A). The speeches of Pericles in Thucydides; view of the Periclean age. The *Agamemnon* of Aeschylus; characteristics of Aeschylean tragedy. Pindar. Professor FLAGG.

Greek. 4 (B). Selections from the Attic Orators; development of oratory. The *Electra* and *Philoctetes* of Sophocles; characteristics of Sophoclean tragedy. Professor FLAGG.

Greek. 4 (C). The *Gorgias* of Plato; introduction to Greek philosophy. The *Iphigenia Taurica* of Euripides; characteristics of

Euripidean tragedy. The Frogs of Aristophanes ; history of Greek comedy. The three last-mentioned courses are lecture courses. They are mainly exegetical, and adapted to prescribed collateral reading. Professor FLAGG.

Latin. 6. Selections from the Republican literature : Plautus, Lucretius, Catullus. Professor HALE.

Latin. 7. Selections from the literature of the Early Empire : Pliny the Younger, Tacitus, Juvenal. In connection with the study of Pliny, brief selections from Martial, Aulus Gellius, and the correspondence of Fronto and Marcus Aurelius are read at sight or at hearing in the class-room ; in connection with the study of Tacitus, brief selections from Valerius Maximus, Velleius Paterculus, and Suetonius ; in connection with Juvenal, selections from Persius. Professor HALE.

Cape's Early Empire and Age of the Antonines, and passages from Merivales' History of the Romans, are studied as a part of the subject-matter of this course. And in both of these advanced Latin courses, (6 and 7), Cruttwell's and Teuffel's Histories of Roman Literature are employed, to supplement the brief course in the History of Roman Literature which forms a part of the required work of the Sophomore year.

[The study of Terence and of Horace is provided for in the required work of the Sophomore year].

II. HISTORY AND ANTIQUITIES.

History and Political Science. 2. Private, political, and legal antiquities of the ancient Greeks. The first two terms will be devoted to the study of the private life of the Greeks, assisted by lantern views illustrative of the ancient monuments. The third term will be occupied in a discussion of the political and legal institutions of Athens and Sparta. Professor WHEELER.

History and Political Science. 3. (Latin 10). The private life of the Romans. A systematic treatment, with illustrations by lantern views, photographs, etc., from the remains of ancient art, and, in particular, from the results of excavations in Pompeii, Herculaneum, and Rome. Professor HALE.

History and Political Science. 3. (Latin 10). Greek and Roman Art : Pottery, coins, engraved gems, painting, sculpture. An introductory course, illustrated with lantern views, photographs, casts, etc. Professor HALE.

III. PEDAGOGY.

Latin. Teachers' Seminary. Introductory lectures on the relation of preparatory and university work in Latin, and on the order of arrangement and methods to be employed in the former. Brief survey of Latin Syntax, with reference to the needs of young students at various stages in their preparation. Practical illustrative work in Cæsar and Cicero, conducted by the instructor and by members of the Seminary. Professor HALE.

In connection with the Teachers' Seminary, graduates of other universities may find it helpful to be present at the weekly exercise of the Freshman class, conducted by the Professor in charge of the de-

partment, in which special training is given with a view to the acquisition of the power of rapid reading.

The following course will also be of service to students intending to become teachers :

Latin. 5. Practice in speaking and writing Latin. Professor HALE.

IV. SCIENTIFIC AND SYSTEMATIC STUDY OF THE LANGUAGES.

Comparative Philology. 1. General introduction to the Science of Language. A course of weekly lectures extending through the year. Professor WHEELER.

Comparative Philology. 2. Comparative Grammar of the Indo-European Languages. A review of the salient characteristics, and a systematic phonology of the various branches of the Indo-European family. The winter and spring terms are devoted to the study of Greek and Latin Grammar from the comparative point of view, and chiefly with reference to the history of sounds and inflections. Professor WHEELER.

Comparative Philology. 3. The Elements of Sanscrit. This course of two hours a week will be offered each year, and so many as desire will be afforded the opportunity of continuing the study with more advanced work in subsequent years. Professor WHEELER.

Comparative Philology. 4. Philological Seminary (each year). Critical and linguistic study of Homer's Iliad. Study of the Greek dialects from the inscriptions. Discussion and investigation of questions in comparative grammar. Professor WHEELER.

Latin. 8. Inscriptions: Allen's Remnants of Early Latin, in connection, especially, with Ritschl's *Priscæ Latinitatis Monumenta Epigraphica*. The inscriptions dealt with are studied in the classroom in fac-simile, (so far as fac-similes exist), by the aid of the lantern. Professor HALE.

Latin. 8. The pronunciation of Latin: A study of the evidences at first hand. Professor HALE.

Latin. 8. A course of lectures, for students somewhat advanced, on the syntax of Early Latin, of the Latin of Cicero's time, and of Latin of the Early Empire. Professor HALE.

Latin. 12. Seminary: The critical study of portions of some author selected for the work of the year. Professor HALE.

Latin. 13. Seminary: The investigation of unsettled problems in Latin syntax. A course of introductory lectures is given on the aim and methods of syntactical study, after which an analysis is made of the treatment of portions of syntax in several of the more important grammars. The work of the Seminary is then directed upon some particular problems. Various portions of the literature are read by various members of the Seminary, with reference solely to the collection of evidence bearing upon the problems in hand, and reports of the results are made in the Seminary as material. Professor HALE.

Members of the Seminary will find much assistance to be given by the study of Sanskrit and of Anglo-Saxon. Opportunities for this study are provided by the University. (See Comparative Philology, 3, and English, 7).

ANNOUNCEMENTS.

The means of publication of the results of successful work in the Seminaries is afforded by the *Cornell University Studies in Classical Philology*, of which the opening numbers have recently been published, and are to be had of Messrs. ANDRUS & CHURCH, Ithaca, N. Y.

In connection with the departments of Greek and Comparative Philology, a study-room has recently been fitted up for the use of advanced students and members of Seminaries, and, through the generosity of a friend of the University, equipped with an ample reference library of standard works on History, Antiquities, Language and Literature.

ROMANCE LANGUAGES.

Although no distinct organization of a graduate department exists in Romance Literature and Philology, yet provision is always made for advanced study for both undergraduates and graduates. Many of the courses offered to undergraduates are in their nature graduate studies, while for those who have already taken similar course new ones are laid out with reference to the previous studies and wants of the individual. For the present year the following courses are of the nature of graduate study.

FRENCH.

Course 3. Drama of the XVII century ; Corneille's *Cid* ; Racine's *Phèdre* ; Molière's *Tartuffe*, with lectures upon the origin and history of the French serious drama before Corneille.

SPANISH.

Course 7. Cervantes' *Don Quixote* ; Calderon's *El Magico Prodigioso*.

ROMANCE PHILOLOGY.

A course is offered every year in the undergraduate department covering the general principle of French Philology, and courses in Spanish and Italian are always given. Especially attention is given to Old-French and Provençal. Courses 9, 10, 11 are given this year to students who have had French, Spanish, Italian, Old-French, (*Chanson de Roland*, *Aucassin et Nicolette*, *Amis et Amiles*) and Provençal, (*Bartsch-Chrestomathie provençale* and reading in individual authors) and a course in comparative phonology and inflections of French, Spanish and Italian.

The courses for this year are :

Course 9. Darmesteter and Hatzfeld, *Le Seizième siècle en France*, phonology, inflections and literary history.

Course 10. Italian of the XIII century. Ulrich's *Altitalienisches Lesebuch*. Study of the phonology and inflections of the early Italian dialects.

Course 11. Methods and fields of study in the Romance literatures, devoted chiefly to Mediæval Latin literature with reference to the source of the Romance literatures, such as Latin hymnology with reference to Romance versification, etc.

GERMANIC LANGUAGES.

The aims contemplated by the German Department during the first two years of the course, besides preparing the student for progressive and independent work, are to afford practice in reading at sight, in prose composition, and in literary biography, to discuss the origin and relations of the language, and to impart some knowledge of the standard classics.

During the later years occur lectures and recitations on German history, literature, and mythology, and courses are given varying from year to year, embracing the works of the leading authors. Classes are formed in composition and conversation, and recent dramatic literature and the works of living novelists are read. Instruction is also offered in Gothic, Old Saxon, Old and Middle High German, and in the Scandinavian and Netherland languages.

For advanced students the seminary system of study has been employed for some years with satisfactory results. To different members of such classes different portions of the same general subject are assigned, with references to the proper authorities or sources; or individual members pursue individual courses of reading under the supervision of the professor in charge. Lectures for such as intend to become teachers are given on class-room methods and exercises and theories of instruction in the modern languages. Generous provision has been made by the University for the employment of lantern views for illustrative purposes, and increasing use will be made in the future of this interesting and valuable addition to the equipment of the department.

To graduate students these regular courses are open, while special courses of study may be arranged in accordance with their previous attainments, and the resources of the various libraries connected with the University are made available for personal use. To such students the courses offered by the departments of Comparative Philology, Romance Languages, and History and Political Science, present many advantages in addition to their special studies in the German Department itself.

ENGLISH LANGUAGE AND LITERATURE.

The following courses are open to graduates of the University who have taken all the undergraduate work in English Language and Literature, and to graduates of other Institutions who have taken what may be regarded as an equivalent:

1. The 'Lautlehre' portion of Sievers' "Angelsächsische Grammatik," §§ 1—234; Cædmon's Genesis, Exodus, and Daniel; Judith; The Phoenix; The Panther; The Whale; Menologium (Poetical Calendar of the Anglo-Saxons); Solomon and Saturn; Beowulf. A course of 10 lectures on Anglo-Saxon Literature. Professor CORSON.

2. Mätzner's "Englische Grammatik" and "Altenglische Sprachproben" (Prose and Verse); Bernhard ten Brink's "Geschichte der englischen Litteratur, bis zu Wiclifs Auftreten;" a Course of Lectures on the Bibliography, etc., of the publications of the Early English Text Society. Professor CORSON.

3. A comparative study of the dramatic art of the more important dramatists of the Shakespearian era (especially of Marlowe, Ben Jonson, Beaumont and Fletcher, Chapman, Webster, Massinger, and Shirley), and the dramatic art of Shakespeare. Professor CORSON.

Moulton's "Shakespeare as a dramatic artist, an illustration of the principles of scientific criticism," is studied in connection with this course.

4. A course of 20 lectures on literary æsthetics. Professor CORSON.

This course includes a general treatment of the æsthetics of English verse, analyses of the more important stanzas employed by English poets, a treatment of the development of Shakespeare's dramatic verse, as a chronological test, and of his distinctive use of verse and prose.

The following courses regularly offered to undergraduates may frequently be taken with profit by graduate students :

7. Anglo-Saxon grammar, and the A. S. version of the Gospel according to St. John. Selections from the Homilies of Aelfric, from King Alfred's A. S. version of the history of Paulus Orosius, from Boethius de Consolatione Philosophiae, and from the A. S. Chronicle. Professor CORSON.

8. Lectures on English Literature, including the period from Milton to Cowper, the drama of the Restoration, the subsequent drama to Sheridan, and the literature of the XIXth century. Professor CORSON.

9. English Literature. A general survey of the language and literature of XIIth and XIIIth centuries. Lectures on Piers Plowman, Wycliffe, Chaucer, Spenser, and the Shakespearian drama. Readings by the class. Professor CORSON.

10. Seminary in English Literature. The direct study of masterpieces in English prose. Two hours. Mr. HALE. Open to students who have taken undergraduate courses 1, 2, and 6, or their equivalent, and to no others except by special permission of the instructor.

HISTORY AND POLITICAL SCIENCE.

This department of instruction, organized into what is known as the President White School of History and Political Science, is divided into four somewhat distinct lines of activity : viz, General History ; American History ; The History of Political and Municipal Government and of International Law ; Political Economy, Finance, and Social Science. All of the courses of instruction as given in the official announcement, so far as they may not have been taken before graduation, are open to graduate students. The advanced courses are adapted to those who, either here or elsewhere, have made a special study of history and political science as undergraduates ; the other courses being suited to the wants of such as have not already devoted themselves especially to such studies before graduation. The History and Political Science Association is an organization consisting of professors, instructors, and students, and is designed to bind into sympathetic activity all the forces of this department of the University. At its meetings papers are presented and discussions held on subjects of common interest. The following is perhaps a sufficiently specific account of the courses given.

1. *General History.* Instruction in ancient history will include three courses throughout the year; one of two hours a week on the general political history of Greece and Rome; one of two hours a week on the Private, Social and Political Life of the Greeks, and one of one hour a week on the Development and the Leading Principles of Roman Law. In the following year a course on Roman Life may be expected in place of that on Greek Life. The course on the Middle Ages of three hours a week throughout the year will be directed especially to the study of mediæval civilization, institutions, and thought, and will furnish abundant opportunities for the use of the original materials with which the University Library is richly equipped. Care has been taken to supply the material for a thorough training in palaeography, and any students desiring to carry on advanced research in the manuscript and other original sources of mediæval history will receive especial attention. A course of three hours a week will be devoted to the general history of Europe from the Renaissance to the French Revolution; and a course, also of three hours, on the period from the Revolution to the War of 1870. A course of one hour a week will be given on the historic achievements of statesmanship, and a seminary of two hours to the examination of obscure historical and political questions. The seminary course is especially exacting and can be taken by advanced students only.

2. *American History.* Three courses are given, each extending throughout the year: one of two hours a week on the social, political and constitutional development of the Colonial period; one of three hours a week on the period extending from the meeting of the Constitutional Convention to the Civil War; and a Seminary organized for the investigation of constitutional and political questions. Each member of the Seminary at the beginning of the term receives a subject for investigation in the library; at each meeting he makes a detailed oral report of his progress, and at least one week before the end of the term is required to hand in to the instructor the written results of his term's work. The effort is made in all cases to work from the sources, and for such methods the library furnishes very considerable facilities. Especially worthy of note are the collections of original documents once belonging to Jared Sparks, E. B. O'Callaghan, Samuel T. May, Andrew D. White, and others, now belonging to the University library, and accessible to seminary students.

3. *Political and Municipal Institutions and International Law.* The several courses of lectures of the professor of the History of Political and Municipal Institutions and International Law cover the principal topics connected with the rise and organization of states, the adjustment of governmental machinery, and the principles of local, national, and international policy. The method is historical, comparative, and critical. Only advanced undergraduates and graduates who have had, at this university or elsewhere, the requisite preliminary studies, are admitted to these courses. For graduates, additional courses of reading are prescribed, and the examinations, especially in case of candidates for a degree, will include such readings. The general historical and political seminary, which is intended to give training in the methods of original research, and the critical study of

sources, meets weekly, under the charge of the professor, and with the aid of the liberal resources of the library provides for investigations in the more important fields of historical and political science. It is also proposed, if sufficient desire should appear, to connect with the seminary a series of lectures on the weighing of authorities, the rules of historical composition, and the principles of the leading historians.

4. *Political Economy, Finance, and Social Science.* In addition to a course of three hours a week on the principles of political economy, three courses of an advanced character may be expected. The first, consisting of lectures and examinations twice a week throughout the year, will be devoted to an examination of unsettled problems in political economy and finance. A second course, also twice a week, will aim to give a comprehensive, and as far as is practicable, a critical account of the history and management of industrial, charitable, and penal institutions in this and other countries. The most advanced work will consist of an economic seminary for the examination of obscure questions in political economy and finance. All of the instruction except the course on the fundamental principles of political economy above noted are appropriate both for graduates and advanced undergraduates.

PHILOSOPHY.

With the exception of Sophomore logic and psychology, all the courses in the official announcement may be advantageously taken by graduate students. These are as follows :

1. A laboratory course in physiological psychology along the lines of Wundt's classic treatise. This course will be given for the first time in 1888-9.

2, 3. A historico-critical course in philosophy, extending over two years, with the object of reaching a tenable theory of Knowing and Being, by means of a careful survey of the leading systems. The course is conducted in part by lectures, and in part by conferences, discussions, and essays. In 1887-8, modern philosophy ; in 1888-9, ancient and mediæval philosophy.

4. A historical and systematic course (conducted like the preceding) on ethics, with considerable attention to evolutionary theories, and an attempt to trace the growth of moral ideals and institutions among civilized and uncivilized races.

5. A seminary, extending over two years, on Kant's three Critiques, which is open only to those who have taken courses 2, 3, 4, or who have taken at least two of them and are taking the third. In 1888-9 the ethical and religious portions of Kant's philosophy will be taken up.

6. A more advanced seminary, open only to those who have taken course 5, on post-Kantian German philosophy. In 1887-8, Hegel's *Wissenschaft der Logik* ; in 1888-9, either Hegel's *Encyklopädie der philosophischen Wissenschaften*, or Lotze's *Metaphysics*.

THE SCIENCE AND ART OF TEACHING.

The entire work of this department is of such character as to be pursued with great advantage by graduate students who intend to devote themselves to the work of teaching or of school supervision. A

knowledge of Physiology, Psychology and Logic equal to that given in Course 1 Department of Philosophy is needful for those who would pursue with advantage Courses 1 and 2 in this department; and with the purpose of securing these prerequisites its courses are open only to graduates, and members of the two highest University classes.

The Seminary presents a wide range of work suitable for the most advanced students, in the investigation of important educational subjects by the aid of the University library, which is already fairly well supplied with the needful materials, the results of such work being always presented in the form of carefully prepared reports. To students who come prepared with a sufficient knowledge of German, facilities will be offered for the critical study and discussion of the rich pedagogical literature in which that language abounds, under the direction of the professor in charge.

The History of Education, in addition to the series of lectures offered in Course 3, opens to advanced students opportunities for profitable work, in the study of various educational systems, and in the critical examination and comparison of the theories of eminent writers on Education. For the successful pursuit of this more advanced work, a good knowledge of German and French is highly desirable.

Whenever occasion demands, special facilities will be afforded to those wishing to prepare themselves for the work of school supervision, in addition to those presented by the courses of lectures offered by the department.

The attention of those intending to teach Latin, German, or Mathematics, is also directed to the pedagogic instruction afforded by those departments in Course 9, Latin; Course 9, Germanic Languages; and Course 17, Mathematics.

The following courses are regularly offered:

1. The science of education. Philosophic basis; aims; methods; means. School instruction: Application of methods to various branches; recitations; art of questioning and examining; illustration and exposition. Organization and management of schools: Classification; courses of study; supervision; school buildings and appliances; school hygiene; school economy, etc. Lectures. Professor S. G. WILLIAMS.

2. Seminary. Discussions and essays on topics connected with course 1. Professor S. G. WILLIAMS.

3. History of education in various ages and countries. Comparative education; theories of writers on education; eminent educators, etc. Winter and Spring. Lectures. Professor S. G. WILLIAMS.

MATHEMATICS AND ASTRONOMY.

This department offers the following courses of intermediate and graduate work to such students as have the requisite preparation. Each course extends through either one or two collegiate years, and the number of hours per week given to it in the lecture-room is as indicated.

Most graduate students in mathematics find it best to remain at the university at least two years, as no adequate conspectus of so

wide a field, or even of any one of its great departments, can well be got in a less time. The courses are therefore arranged so that any graduate having fair ability, and a good acquaintance with course 8, and preferably also with 11, 12, and 13, may make up a two years' programme of connected and profitable studies. Some of the courses are arranged in pairs, for alternate years. The department reserves the right to defer for one year, if it seem advisable, any course that is not desired by at least three students.

These courses are intended,—first, to include enough of each of the chief branches of pure and applied mathematics to meet its fundamental difficulties, point out its leading ideas, its scope and correlations, and make the student comparatively independent of further help,—and, secondly, to facilitate the student's more thorough mastery of some one branch or topic.

In the instruction given, it is sought to diminish the necessary memorizing and "dead work"; to have a certain few fundamental results carefully learned, while other results may be tabulated by the student for his own use; to develop imagination and insight as applied to systems of thought, judgment with respect to logical relations, and inventiveness. Particular attention is given to symbolic methods as such; and also, on the other hand, to the art of working almost without symbols. The instruction is especially adapted to those intending to be teachers or investigators, and includes the criticism of mathematical style and notation.

In connection with his reading or with the lectures, the student usually has work assigned him, upon problems or general theory, to be prepared at home, and presented orally or in writing. He is encouraged to use original methods, with only so much of help or suggestion from the teacher as is really needed. To strengthen his grasp upon an entire subject, he may be asked to write out a synopsis of it, using various text-books and memoirs as bases, and having reference to philosophical arrangement and logical sequence. In this work, and in following up lines of special inquiry, he is encouraged to make free use of the University Library; and he is shown how to do so most effectively.

The Library contains over 3,000 volumes on pure and applied mathematics and on astronomy, including many of the chief mathematical periodicals, and many series of such other transactions and journals as contain important mathematical and astronomical papers. This estimate does not include pamphlets, ephemerides, annals of observatories, nor technical treatises on the allied sciences.

The courses are numbered as in the University Register: those marked * are not due in 1888-89. The lecture-hours will be arranged by the instructors, to suit the classes.

8. Analytic Geometry and Calculus, for beginners. 5 hours.

11. Geometric, Algebraic, and Trigonometric Problems, with Applications; including something of Probabilities and Insurance, and of Spherical Astronomy. 2 hours. Professor JONES.

12. Determinants and Theory of Equations. 2 hours. Professor WAIT.

13. Advanced work in Trigonometry. 1 hour. Prof. WAIT.

[The equivalents of courses 8, 12, and 13, are necessary, and course 11 is useful, as a preparation for most of the courses that follow.]

14. Advanced work in Analytic Geometry of two and three Dimensions, viz. :—

(a) First year, Lines and Surfaces of First and Second Orders. 3 hours. Professor JONES.

(b) Second year, General Theory of Algebraic Curves and Surfaces. 2 hours. Professor OLIVER.

15. Modern Synthetic Geometry, including Projective Geometry. 2 hours. Professor JONES.

16. Descriptive and Physical Astronomy. 3 hours. Mr. STUDLEY.

17. The Teaching of Mathematics, seminary work. 1 hour. Professor OLIVER, and most of the teachers in the Department.

18. (a) Mathematical Essays and Theses : (b) Seminary for discussion of results of students' investigations. Professor OLIVER.

19. Advanced work in Differential and Integral Calculus. 3 hours. Mr. FISHER.

20. Quantics, with Applications to Geometry. Requires Courses 8, 12, 14 (a), and preferably also 11, 13, 19. May be simultaneous with 14 (b). 3 hours. Mr. McMAHON.

21. Differential Equations: to follow course 19. 3 hours. Mr. HATHAWAY.

22. Theory of Functions; the general theory, with a sketch of the Elliptic and Abelian Functions. Requires course 19, and preferably 21. Mainly from Briot and Bouquet, Riemann, Hermite, and Weierstrass. (a) First year, 3 hours. (b) Second year, 2 hours. Professor OLIVER.

23. Celestial Mechanics. 3 hours. Professor OLIVER.

* 24. Spherical Harmonics and the Potential Function. 2 hours. Professor OLIVER.

25. (Alternating with 24). Finite Differences. 2 hours. Professor OLIVER.

* 26. Rational Statics. 2 hours. Professor WAIT.

27. (Alternating with 26). Rational Dynamics. Professor WAIT.

28. Molecular Dynamics; or, 29, Theory of Numbers. [28 is based on Sir Wm. Thomson's Baltimore lectures, as printed from Mr. Hathaway's notes; 29, is based on Delekind's Dirichlet's *Zahlen-theorie*, but gives a new theory of determinately-combining ideals.] 3 hours. Mr. HATHAWAY.

30. (a) Vector Analysis; or, (b) Hyper-geometry; or, (c) Matrices and Multiple Algebra. 2 hours. Professor OLIVER.

31. Theory of Probabilities and of Distribution of Errors, including some sociologic applications. 2 hours. Professor OLIVER, or Professor JONES.

41. Mathematical Optics, including Wave Theory and Geometric Optics. 2 hours. Professor OLIVER.

* 42. Mathematical Theory of Heat and Thermodynamics. 3 hours.

43. Mathematical Theory of Sound. 3 hours. Mr. McMAHON.

44. Mathematical Theory of Electricity and Magnetism. Professors OLIVER and WAIT.

In most of the above branches of Pure Mathematics, an additional year's instruction, 1 or 2 hours per week, may be given if desired.

PHYSICS.

(8). Theory of Electricity ; two hours. Lectures, supplemented by recitations upon selected chapters from Mascart and Jamin's *Leçons sur l'Electricité et le Magnétisme*. Professor NICHOLS.

(9). Electro-dynamic Machinery ; two hours. Lectures, supplemented by recitations upon Thompson's *Electro-dynamic Machinery*. Professors NICHOLS.

Courses 8 and 9 will be given in alternate years.

(10). Theory of Heat ; two hours. Assistant Professor MOLER.

(11). Theory of Sound ; two hours. Assistant Professor MOLER.

Courses 10 and 11 will be given in alternate years.

(12). Physiological Optics and the Science of Color ; three hours. One lecture a week and laboratory practice. Professor NICHOLS.

(13). Kinematics and Dynamics ; two hours. Based upon MacGregor's *Kinematics and Dynamics*. Mr. PRATT.

(14). Physical Optics ; two hours. Based upon Glazebrook's *Physical Optics*. Mr. PRATT.

Courses 13 and 14 will be given in alternate years.

(15). Readings and Discussions ; two hours. Critical reading of the standard periodical literature relating to Physics. One evening a week. Professor NICHOLS, Assistant Professor MOLER and Mr. PRATT. Undergraduates taking elective work in Physics, and Seniors in Electrical Engineering will be admitted to this class upon special application.

(16). Absolute Measurements in Electricity and Magnetism ; three hours. Laboratory practice in the determination of current, electromotive force, resistance, electric capacity and the magnetic elements in absolute measure. Professor NICHOLS, Assistant Professor MOLER and Mr. PRATT.

(17). Thermometry and Calorimetry ; three hours. Laboratory practice, including the study of the thermometer as an instrument of precision, methods of measuring temperatures and thermal capacities, influence of temperature upon various physical constants. Professor NICHOLS, Assistant Professor MOLER and Mr. PRATT.

(18). Advanced Spectroscopy ; three hours. Laboratory practice, devoted to the use of the spectrometer and spectrophotometer. Professor NICHOLS, Assistant Professor MOLER and Mr. PRATT.

Other courses of laboratory instruction will be arranged to meet the individual needs of graduate students.

CHEMISTRY, PHARMACY AND METALLURGY.

Analytical Chemistry. New methods of chemical analysis are continually appearing in the journals, all of which must undergo the test of practice in many hands before they can supersede established standard methods. There is an abundance of interesting and important work of this kind, for the advanced student in chemistry, in the prosecution of which still other new and original methods may present themselves for consideration and trial. All the necessary facilities for this work in its various branches are offered in the analytical laboratory.

Advanced courses of instruction are also provided in the assaying of ores of gold, silver and lead ; in blowpipe analysis and determinative mineralogy, and in the practical operations of pharmacy.

Applied Chemistry. Lectures on chemistry applied to the arts are given throughout the year. The subjects treated are the processes of manufacture of acids, alkalies and salts, soap, gas, explosives, glass, porcelain, paper, and many other commercial products. Bleaching, dyeing, tanning, photography, food and drink, disinfection, etc., are also discussed. These lectures are illustrated by charts, drawings, lantern views and specimens from the museum of applied chemistry. The study of the subject is supplemented by practice in the quantitative laboratory on the analysis of commercial products, foods and drugs, testing of kerosene, and many other technical determinations.

Agricultural Chemistry. The probable location at this University of the Agricultural Experiment Station, supported by an annual appropriation of \$15,000 from the United States Treasury, will afford superior facilities for the prosecution of advanced study and research in this important branch of applied chemistry. Questions of crop production, of animal nutrition, of the chemical aspects of the management of the dairy, of methods of analysis of agricultural materials and products may be studied and investigated by the student who is interested in such subjects.

Organic Chemistry. Special facilities are offered for the study of organic chemistry, and a separate laboratory has been lately built and equipped for work in this branch. The system followed is essentially that introduced by Professor Remsen at Johns Hopkins University, and is designed to give students something more than a theoretical knowledge of this important new field of science. The course consists of lectures, and laboratory practice in the preparation of typical compounds by well-known reactions, in the course of which the student becomes familiar with the special methods of manipulation employed in organic chemistry. More detailed study of certain classes of compounds is then taken up under the guidance of the instructors, and as soon as the student shows the necessary aptitude he is encouraged to undertake some line of original research. The reading room of the organic laboratory contains full sets of all the important foreign journals devoted to this branch of chemistry.

Chemical Philosophy. For the prosecution of the study of chemistry as a philosophical system, and in its theoretical aspects, abundant facilities are offered, in the files of all the important chemical journals, and all the recent works on chemical theory, which are to be found in the library of the chemical laboratory, or in the University library. Some of the lines of investigation that have led up to recent theories, or have yielded striking results in support of them may be profitably followed out in the laboratory by the advanced student, as useful preparation for future original work on his own part in this higher field of chemical research.

BOTANY.

Eight courses of instruction are offered to undergraduates. For information as to subjects and other particulars the Register may be consulted. In many cases it is probable that some of the more advanced of these courses may be advantageously taken by graduate students. Among special subjects offered to graduates, and for the study of which superior facilities are afforded, the following may be named :

The structure and development of some species of plant chosen as a type of an important group, either of the phanerogamia or the cryptogamia. In this course the chief purpose is to afford instruction in methods of morphological and biological research.

Studies of questions and problems in the physiology of plants. In the prosecution of these studies opportunities are afforded for the performing in the laboratories or plant houses, many of the simpler experiments in plant physiology.

The study of individual plants or groups, designed especially for those who intend to become physicians, agriculturists, horticulturists, or teachers of botany.

Facilities for instruction and research are afforded by the herbaria ; by the morphological and economic collections ; by the laboratories, general and special ; by the considerable botanical library which includes especially most of the more important recent works in various branches of the science ; the collection of living plants in the plant houses, and by a very rich local flora easily accessible from the University.

The herbaria, laboratories, library, collections and plant houses are open to students who are prepared to use them properly and advantageously ; and for the profitable study of the local flora organized excursions are made from time to time.

ENTOMOLOGY AND GENERAL INVERTEBRATE ZOOLOGY.

This department is open to students during the Fall and Spring terms, and for a term of ten weeks during the Summer vacation. The instruction is given by means of lectures, laboratory work, and observations in the field.

Lectures. The lectures are as follows : (1) A course on General Invertebrate Zoology, during the Fall term. (2) A course on Entomology, extending through the Spring term. (3) A more special course on Entomology and the Methods of Entomological Investigation, forming a part of the Summer course.

Laboratory Work. The greater part of the advanced work in this department is done in the laboratory. This work is arranged with reference to the needs and attainments of each student. After completing the elementary course in either general zoology or entomology, the student may select some special subject for study. It is planned to have the work of each student, so far as is possible, an original investigation ; the chief object of the instruction is to give training in methods of natural history work. The special subject may be in either of the following lines of study : Anatomy of inver-

tebrates, systematic entomology, habits and transformations of insects, economic entomology. The laboratory is supplied with the material and apparatus necessary for carrying on work in each of these lines; and the Library of the University contains the more important journals and works of reference in this department.

Field Work. Owing to the economic bearings of entomology, and to the fact that insects are the most available animals for study away from the sea shore, great pains have been taken to develop the facilities for the study of entomology at this University. In order that there might be an opportunity for carrying on this study in the field, the Summer course was established. Two forenoons of each week throughout the Summer term are devoted to observations in the field.

Summer Course. This begins the first Monday following Commencement and continues ten weeks. The lectures and field work are devoted chiefly to the study of insects; but students wishing to study the structure of other invertebrates have an opportunity to do so in the laboratory. Any one desiring to join this class should make application to Professor COMSTOCK as early as June 10th.

PHYSIOLOGY AND VERTEBRATE ZOOLOGY.

Some of the courses enumerated under the head of Physiology and Vertebrate Zoology consist of laboratory work only; others (Anatomical and Microscopical Methods, Embryology and Morphology of the Brain,) are lectures necessarily accompanied by laboratory work, and even in the general courses of Physiology and Vertebrate Zoology one third of the exercises are *practicums* at which the student examines or dissects various representative forms or important organs like the brain and heart. Hence, a graduate of an institution where the above-named subjects are taught from text-books or by lectures only may find it desirable to take certain undergraduate courses before or in connection with the advanced work described below. The attention of those who intend to study medicine is called to the fact that one who takes the branches named under (A) (B) (C) (D), will gain methods and information respecting normal and descriptive anatomy and histology which will enable him, in a medical school, to devote more time to the surgical and pathological aspects there presented.

(A). *Anatomy of the Cat.* The viscera, including the brain, of this easily accessible and fairly representative mammal are examined at the practicums in connection with course (1); in the laboratory it is dissected with great thoroughness; the student is required to draw and describe certain parts accurately, and is able to compare his dissections with permanent preparations of parts like the vagus nerve and the thoracic duct which offer special difficulties. Particular attention is given to methods of injecting, preparing and preserving; the brain and hollow organs, like the heart, are subjected to methods more or less peculiar to this institution.

(B). *Practical Human Anatomy.* After methods of anatomical manipulation have been acquired upon the cat, human material is provided. Entire young subjects and parts of adults have the arte-

ries injected and are preserved in alcohol, so that dissection may be made with care, bad odors are avoided and dissection-wounds are innocuous. Standard works and atlases are accessible, and there is a manikin of full size.

(C). *Advanced Histology*. After taking Microscopical methods (course 6) the student may pursue advanced vertebrate histology, especially that of muscular tissue; the necessary materials and instruments are provided, including a first-class microscope with apochromatic lenses.

(D). *Megascopic Anatomy of the Brain*. The cat's brain is examined at several of the practicums of course (1), and more thoroughly together with the human brain in course (4). Fresh animal brains are always provided, and human brains when possible. The museum contains 325 preparations of the cat's brain and 233 of the human brain.

(E). *Comparative Anatomy of the Brain*. Besides the human and feline preparations mentioned under (D) the museum contains about 350 preparations of other vertebrate brains.

(F). *Embryology*. An incubator furnishes material for the practical illustration of lectures on this subject. The development of frogs and lampreys may be studied in the spring, and the museum contains extensive series of the young of man, the cat, marsupials, *Necturus*, *Lepidosteus* and *Petromyzon*.

(G). *Museum Methods*. The vertebrate division of the museum is arranged so as to illustrate certain more important facts and generalizations, some of which are set forth in the curator's address on "Educational Museums of Vertebrates."

(H). *Experimental Physiology*. The simpler functions of nerve, muscle and brain are illustrated by painless experiments upon the frog and cat in course (1); the methods of performing these experiments may be learned in the laboratory.

(I). *Material for Research*. Of the American forms *Alligator*, *Amia*, *Lepidosteus*, *Cryptobranchus*, *Necturus*, and *Petromyzon*, there are series of preparations; numerous alcoholic examples are always in store, and living individuals may be obtained at short notice at the proper season: living necturi are kept through the year. Of the comparatively rare or costly forms named in the following list there are alcoholic examples for monographic study by those who are qualified: *Branchiostoma*, *Ceratodus*, *Protopterus*, *Polypterus*, *Cestracion*, *Myxine*, *Bdellostoma*, *Heloderma*, *Sphenodon*, Marsupials and Brazilian fishes. An opportunity for the study of individual variation is offered by the large numbers of certain specimens which are used in the laboratory or the class practicums; from 75 to 200 of the following are used annually: cats, frogs, necturi, lampreys, ascidians, branchiostomas, perch, cat-fish, alligators, cat brains, and sheep hearts.

(J). *The Local Fauna*. About fifty species of fish are known to inhabit Cayuga Lake; most of them are represented in the museum, having been identified by Prof. Seth E. Meek, late Fellow of this University and formerly assistant to Prof. David S. Jordan.

GEOLOGY, PALEONTOLOGY, AND MINERALOGY.

Students desiring to make thorough study of Geology will find, in addition to provision for undergraduate work in the principles of geology, dynamical, petrographic, paleontologic, and stratigraphic, special facilities for graduate studies, as follows :

In Geology, provision is made in collections, laboratories, and the other means of study and investigation, for advanced study in general geology ; in the principles of structural and stratigraphical geology, as found in the original reports of surveys of this country and foreign lands and in geological journals ; in the detailed study of economic problems of geology by physical and chemical examinations of the properties of rocks and rock masses ; in the scientific investigation of mineralogy and petrography, large collections of specimens and slides, with microscopes and other appropriate instruments being at hand for use ; in stratigraphy, systematic geology and paleontology, for which this region, with its nearly horizontal rocks, cut through by numerous ravines, exposed on hillside and lake shores, presents admirable facilities for field study and illustration. A well equipped general collection of fossils from all formations is accessible for special studies. Abundant representatives of Devonian fossils, from hundreds of localities, both of this and foreign countries, furnish the means for the comparative study of paleontology, while special collections are provided for the detailed study of the biological problems in which the paleontologist is interested.

Literature is already at hand in the libraries for all of the general studies of the advanced student, and provision is made for obtaining any literature or specimens needed to make thorough investigations in special lines, as students appear who are capable of such work.

Graduates from this department already holding important positions on State and Government surveys, or located as Professors in various parts of the country, are always willing to offer assistance to advanced students of this department by putting them in the way to examine specimens from other regions not otherwise accessible.

No courses of lectures are provided specially for graduate students, but personal direction and instruction is given in the laboratory to those taking advanced work. In the regular undergraduate courses lectures on Survey Methods, on advanced Paleontology, and on advanced Mineralogy and Crystallography are given in addition to the general courses in Geology and Mineralogy.

CIVIL ENGINEERING.

There are professional courses open to graduates in Civil Engineering from any institution giving a suitable preparation, and to such other students or persons whose attainments or particular skill may fit them to prosecute advantageously any of the specialties of these courses. While only graduates in Civil Engineering may become candidates for the advanced degrees of these courses, candidates for several other advanced degrees granted by the University will be

given an opportunity to include in their studies such specialties as they may be able to elect from the graduate courses in Civil Engineering.

Nearly all the required work of these courses is based upon original research in modern questions of professional importance, carried on under the direction of instructors who have had charge of engineering works, and are specialists in their several branches. The system of instruction embraces occasional exercises in the lecture rooms and museums, for the purpose of guiding the lines of investigation prosecuted by the students in the laboratory, consulting room, and library of the department; but the labor, and the devices for the successful issue of the investigations, are left to the care of the student, who must develop his own theories, methods, and experiments, as well as the interpretation of his results. The aim of these graduate courses is two fold: they are intended to supplement the work of the undergraduate courses, and to give opportunity for original investigation; thus favoring the desirable tendency to specialize, and promoting, directly, the progress of various engineering fields. It is believed that one year of graduate work is equivalent to two or three of the first years spent by the young graduate in trying to obtain a foot-hold in his profession, and in which he is hindered by the slow promotion and sharp competition he meets in the lower steps of his career. That such is the fact may be inferred, 1st, by the rapid promotion accorded, without exception, to students who have taken here the graduate courses; 2d, by the increasing number of students who prefer to spend an additional year in the University, or who, after having fixed upon a specialty, return to this department to pursue special investigations; and, 3d, by the high character of the graduates in engineering from the colleges of various countries, who, if they fail in securing the paid Fellowships in Civil Engineering, by severe competition, prefer to remain in the University at their own expense. The advantages offered by these courses may be shown, incidentally, by the fact that corporations or municipalities detail engineers, or grant them leave of absence to carry on special investigations in these courses. Also, professors of other universities or institutions come here during their vacations, and at other times, to engage in the surveys of this Department, or to avail themselves of the facilities of our laboratories, or to prosecute advanced investigations.

The following is a brief resumé of the general scope of the graduate courses in Civil Engineering. Additional details may be obtained from the University Register, or by addressing the Dean of the Department of Civil Engineering.

Bridge Engineering. This course embraces bridge architecture, false works, bridge varieties as to material and forms, superintendence, erection, accessory works, specifications and contracts; bridge details and tests; bridge metallurgy, together with the organization, plans and management of "Bridge Works;" and such advanced studies as have not been fully treated in the undergraduate courses.

Railroad Engineering. This course deals with the higher problems of railway location, construction, maintenance and traffic problems; it includes an advanced course in railway machinery, buildings and accessory works, excepting bridges; and treats with sufficient fulness the politico-economic questions and technical requirements of financiering, jurisprudence and management of railroad interests.

Sanitary Engineering. In this specialty due prominence is given to the sanitary legislation developed by the experience of various countries, and to the investigation of the hydraulic and geological questions involved in sanitary problems, including the important subject of bacteriology. Critical studies are made of executed works of great magnitude, and of the sanitary details of drainage, water collection and sewerage. The administration and management of rural and urban sanitary improvements are studied historically and technically.

Hydraulic Engineering. This course covers the advanced work in hydraulic experimental investigation, not only of the laws of hydraulic science needing further study, but also in reference to hydraulic constructions, including difficult foundations; the problem of water supply, irrigation, and riparian ownership; advanced work in canal, river, coast and harbor improvements and constructions; special study of hydraulic machinery, and other cognate subjects not sufficiently developed in the undergraduate courses.

Geodetic Engineering. In this course is given the most advanced instruction yet attainable in reference to the form of the earth; the subject of international boundaries and surveys; advanced astronomical and geodetic work, and investigation upon the unsettled questions of terrestrial magnetism; gravimetry, hydrology and meteorology, with the necessary advanced work in mechanics and pure mathematics.

These courses call into play the resources of the museum, laboratories, libraries, and teaching forces of several departments of the University.

MECHANICAL ENGINEERING AND THE MECHANIC ARTS.

The work offered in this department is included in the courses of the Sibley College, which is the school of mechanical engineering of Cornell University, and which offers courses in drawing, shop-work, and machine design, and advanced work in engineering, as in the study of the various forms of machinery, electric lighting apparatus, and the heat-engines.

Graduates of other institutions are advised to examine the courses of this department of the University, with a view to the selection of any branches of constructive engineering that may seem best adapted to their needs. Students graduating in the non-technical courses may usually enter the regular courses in mechanical engineering at the beginning of the Junior year: those who may have taken their electives largely in scientific and technical branches, may, to that extent, reduce the length of the course in engineering. Graduates desiring work outside these courses, and demanding no degree, may have courses laid out for them, such as may best suit their purposes, whether in engineering or the mechanic arts. All students who may have taken either of the regular courses in this department leading to a degree, may, after studying one year in post-graduate work, in prescribed courses in special departments, as in marine, electrical, railway, steam, or other branches of mechanical engineering, receive the degree of Master in Mechanical Engineering. Considerable numbers of young men are now studying in the liberal courses of this

and other colleges with a view to subsequently taking technical work. It is always advised that those who have time, and can afford to do so, first secure a liberal education by attendance upon these courses in some thoroughly good institution of liberal learning, and then take up their professional work here; any one of the specified branches of technical study and practice may be selected. The student taking such a course will always find full compensation for the time and expense in a more complete success professionally, as well as in the better preparation for "the sequel of his life," outside his profession, that comes of a "complete and generous education."

The facilities for the study of mechanical engineering offered in the Sibley College are unusually great, the collections being exceptionally extensive and valuable, the shops most completely fitted up and stocked with the best of modern machinery, and the courses of instruction very carefully adapted to the requirements of the time, and taught by specialists, each known in his own department as an expert, both as a teacher and as a practitioner. Every professor and instructor in this establishment has had an exceptionally fortunate experience in practical life in the work of which he is expected to take charge in the college. The University affords the required instruction in pure mathematics and the sciences, and all are, by the carefully planned courses in the several lines taken up, made to work together in the most perfect harmony, and for the common object. Lecture room instruction, drawing-room work, shop-work in wood-working, foundry-work, blacksmithing, and machine shop operations, and extended courses of instruction in experimental and practical engineering in the laboratory of the Sibley College, in mechanical science, and in the chemical and physical laboratories, in the applied chemistry and physics of engineering: all combine to give the earnest student such opportunities and such knowledge, and practical experience as can probably be obtained nowhere else.

Students of other colleges proposing to enter upon courses of post-graduate study in the Sibley College should endeavor to familiarize themselves with its system, and the offered work before their graduation, and thus to become able to judge at what point they can best enter, and what they can best take up. They will find it far better to begin their work at an apparently early stage than to enter into the professional course at a point too far in advance. A review of earlier work can do no harm; to work under excessive load will always prove unfortunate.

MATERIAL EQUIPMENT.

The material equipment of the University is extensive, and is somewhat fully described in the University Register, and, incidentally, elsewhere in this pamphlet. The Museums in all departments have been collected with care, and are arranged with special reference to the work of instruction and investigation. The Laboratories are open to graduate students who are qualified to carry on investigations in them. The Chemical and Physical Laboratories occupy the larger part of the Chemical and Physical Building, and are equipped with the most approved apparatus for modern scientific research. The Botanical Laboratory is located in a wing of Sage College, adjoining a large

conservatory, and is well supplied with illustrative material and means of investigation. The Geological Laboratory and the Anatomical Laboratories, located in McGraw Hall, adjoin the Museums of their respective departments, and the Laboratory of Entomology and Invertebrate Zoology, located in White Hall, contains the larger part of the collections in that department. The students thus have immediate access to standard collections while engaged upon their own work. The Laboratories of Mechanical and Civil Engineering are located respectively in the buildings of these two departments, and are well supplied with instruments and apparatus necessary for such investigations as arise in professional practice. Practical work in the laboratories is, in all instances, made a prominent feature of every course of instruction where it can advantageously be adopted.

In the Literary, Historical, Philological, and Philosophical departments of the University, the Seminary method of instruction is extensively employed with advanced students. For the use of such classes, several Seminary rooms have been provided. These rooms are fitted with tables for the use of students, and contain the works of reference most frequently used, while other works that are needed in particular investigations may be taken temporarily to the Seminary rooms from the University Library.

The library now contains, including the President White Library of History and Political Science, ninety-six thousand volumes, and twenty-six thousand pamphlets. Graduate students have free access to the alcoves of the library at all times. The library is open daily, except Saturdays, from 8 A. M. till 9:30 P. M.; on Saturday from 8 A. M. to 5 P. M. A description of the collections in the different departments will be found in the Register.

The Cornell Library in Ithaca, containing fourteen thousand volumes, is easily accessible to students. It contains a carefully selected and valuable collection.

FELLOWSHIPS.

Among the most important advantages offered by the University to graduate students are the University Fellowships. These Fellowships are intended to offer to young men and young women of exceptional ability and decided purposes the opportunity for advanced study of a high character. They are eight in number, and are known as the Cornell Fellowship, the McGraw Fellowship, the Sage Fellowship, the Schuyler Fellowship, the Sibley Fellowship, the Goldwin Smith Fellowship, the Erastus Brooks Fellowship, and the President White Fellowship. Each yields to the successful candidate the sum of four hundred dollars for one year, or, in cases of remarkable merit, for two years.

The holders must have taken a baccalaureate degree and will ordinarily be recent graduates of this or other institutions; but it is hoped that in occasional cases they will be students who have been for some years graduated, and who, whether as teachers or as professional workers, have felt the need of larger opportunities than they have yet enjoyed. And, similarly, it is believed that holders of these fellowships who are preparing themselves for any profession to which

the work of the University leads will bring to that profession, in consequence of advanced study and research, a range and grasp in their chosen subjects which will lead them to exceptional usefulness and success.

The Fellows are required to reside at the University, and to engage in work leading to a higher degree, with the immediate supervision and assistance of the professors concerned in their respective specialties; and, as the most conspicuous members of the student body, and representatives of the most advanced instruction given, they are expected by high character and high intellectual aims, to exert an influence upon the entire life of the University.

The application of a candidate for a fellowship should contain a full statement of the branches of study the applicant intends to carry on, if appointed; and if he has produced any literary or scientific work that could be put in evidence for him, a copy should accompany his application. Those candidates who are graduates of other colleges or universities than Cornell should submit recommendations from the instructors best acquainted with their ability and attainments in the specialties they desire to pursue. It should be borne in mind by such applicants that information cannot be too exact or full in the case of students not personally known to the appointing body. The list of applicants is large, and the Faculty desires to be aided in every way in making its selections.

In exceptional instances, a competitive examination may be resorted to as a means of discriminating among several candidates.

The appointments are made in part or wholly at the close of the academic year, shortly before Commencement. The applications should be given or sent to the President or Registrar, and should be received not later than June 1st.

PRIZES.

Two prizes of value are open to competition for graduate students, though the competition is not limited to graduates.

1. *The Mrs. A. S. Barnes Shakespeare Prize.* Mrs. A. S. Barnes, of New York City, has given to the University authorities a sum of money, the income from which is to be given annually as a prize for the best Essay on some subject connected with the Plays of Shakespeare, written by a student of Cornell University. The amount of the prize this year is sixty dollars in money. The Essays must be completed and sent to the Professor of English Literature, on or before the first day of June, and must bear, in every case, a fictitious signature, accompanied by the name of the writer in a sealed envelope.

The subject for the present year is:

The dramatic action and motive of King John; the national spirit as embodied in Falconbridge; with a comparative study of "The Troublesome Raigne of John, King of England" (1591), and Shakespeare's King John, as exhibiting the Shakespearian non-partisan spirit.

2. The prize offered by the New Shakespeare Society of London, consisting of a number of valuable publications of the Society, is

awarded to the student passing the best general examination on the Shakespearian work of the year.

GYMNASIUM.

The gymnasium is open to graduate as to all other students. For graduate students, attendance is purely voluntary. The Director of Physical Culture will, when desired, make a physical examination, and prescribe such exercises as may be necessary to correct individual defects. Graduate students will be at liberty to join any of the regular classes conducted by the instructor in gymnastics.

DEGREES.

Courses of graduate study leading to advanced degrees are provided in the following departments : Ancient Classical Languages and Literatures, Modern European Languages and Literatures, Comparative Philology, History and Political Science, Philosophy, Mathematics, Chemistry and Physics, Natural History, Civil Engineering, Mechanical Engineering, and Agriculture.

Candidates for advanced degrees must present themselves for examination in one major and two minor subjects, which must have been determined upon, with the approval of a committee of the Faculty, as early as November 1 of the year in which the degree is expected to be given, if it be the Master's degree, or of the year preceding that in which the degree is expected to be given, if it be the Doctor's degree. The subject of the thesis required must be announced to the Faculty as early as December 1 of the year in which the degree is expected to be given, and the paper in its completed form must be presented as early as May 1.

In case of special distinction attained in the thesis and in the final examination by the candidate for the degree of Master of Arts or Doctor of Philosophy, the degree of merit will be indicated in the diploma by one of the terms *Cum Laude*, *Magna cum Laude*, *Summa cum Laude*.

In case of special distinction attained in the thesis and in the final examination by the candidate for the degree of Master of Science, Master of Civil or Mechanical Engineering, or Doctor of Science, the degree of merit will be indicated in the diploma by one of the terms *With Distinction*, *With High Distinction*, *With the Highest Distinction*.

Successful candidates for the degree of Doctor must print their theses and deposit ten copies in the Library. Successful candidates for the degree of Master must deposit one copy.

The special requirements for these degrees will be as follows :

THE DEGREES OF MASTER OF ARTS, OF SCIENCE, OF CIVIL ENGINEERING, OF MECHANICAL ENGINEERING.

The degree of Master of Arts or Master of Science is conferred on those who have taken the corresponding baccalaureate degree here, or at some other college or university where the requirements for

that degree are equal to those of this University, on the following conditions :

Candidates must spend at least one year at the University in pursuance of an accepted course of study.

The degree of Master of Science is conferred on graduates in Philosophy on the same conditions as on graduates in Science.

The degree of Master of Civil Engineering, Master of Mechanical Engineering, or Master of Science in Agriculture is conferred on candidates who have received the corresponding first degree, upon presenting a satisfactory thesis and passing the required examinations as above, (1) after one year of resident study, or (2) after two years of professional practice and study *in absentia*.

THE DEGREES OF DOCTOR OF PHILOSOPHY AND DOCTOR OF SCIENCE.

The degree of Doctor of Philosophy is conferred on graduates of this University, and of other universities and colleges whose requirements for the baccalaureate degree are equal to those of this University, on the following conditions :

1. In order to become a candidate the applicant must have, over and above what is required for graduation in the course in Philosophy, a knowledge of Greek equal to that required for admission to the course in Arts.

2. The candidate must spend at least two years in the University pursuing a course of study marked out by the Faculty.

3. He must present a thesis of such a character as shall display power of original and independent investigation, and must pass the requisite examinations.

The degree of Doctor of Science is conferred on graduates of this University, and of other universities and colleges whose requirements for the baccalaureate degree are equal to those of this University, on the following conditions :

1. In order to become a candidate the applicant must have a knowledge of Latin and Greek at least equal to that required for graduation with the degree of Bachelor of Science in Natural History ; a knowledge of French and German equal to that required for graduation in Science ; a knowledge of mathematics, of science, of literature, and of philosophy equal to that required for graduation in Philosophy.

2. The candidate must spend at least three years, two of them at this University, in the study of three approved subjects within the departments of Chemistry and Physics, Mathematics, and Natural History.

3. He must present a thesis of such a character as shall display power of original and independent investigation, and must pass the requisite examinations.

FEEES AND EXPENSES.

Tuition of graduate students is free.

Graduate students taking laboratory or shop work will be required to pay for materials actually consumed, and to make a deposit with the Treasurer to cover the same.

The fee for an advanced degree is \$10, and it must in all cases be paid before the degree is conferred.

The necessary expenses for a graduate student are from \$225 to \$300. The amount may be reduced below \$225, and of course can easily be made more than \$300.

RESIDENCE.

All graduate students are required to reside at the University. No degrees are granted for study pursued *in absentia*, except in the technical courses as above indicated. To this rule the Faculty will make no exceptions, inasmuch as they deem it of great importance to the prosecution of advanced studies such as graduate students should be engaged in, that the student should be under the immediate direction of the professors in charge of his work, should avail himself of the libraries and other facilities for study provided by the University, and should be surrounded by an atmosphere of scholarly investigation.

ADMISSION.

Opportunities for graduate study are open, first, to graduates of this University; second, to graduates of other colleges and universities, whose courses of study are substantially equivalent to corresponding courses in this University. The graduate courses are open to women on the same terms as to men. Applicants are regularly admitted at the beginning of the academic year, but may be admitted at other times on approval of the Faculty. Persons not graduates of the University must at the time of admission, present to the Registrar, a diploma, or official certificate of graduation. It is advisable also to bring certificates of scholarship and character, as well as a catalogue of the institution from which the degree was received.

In case any person is in doubt as to whether his course of study would be deemed sufficient to admit him as a candidate for an advanced degree, the Registrar will, on application, state what the probable decision of the Faculty would be.

THE UNIVERSITY REGISTER

Is sent on application to the Treasurer of Cornell University, Ithaca, N. Y. The Announcement of Courses of Instruction may be had of the Registrar of Cornell University, Ithaca, N. Y.

Persons who intend coming to the University are advised to read carefully the printed announcements, and if these fail to make clear to them any particular points, to write to the Registrar for information on these points. Letters of inquiry will always be cheerfully answered; but, generally, needed information will be found most fully stated in the Register and other announcements.

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INSTRUCTION

IN

Greek, Latin, Comparative Philology

AND

Classical Archæology,

FOR THE ACADEMIC YEAR

1894-1895.

ITHACA, N. Y.
PUBLISHED BY THE UNIVERSITY.

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IN ENGLISH AND ROMANCE PHILOLOGY, AND IN ANCIENT
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Rhetoric and English Philology, *34 Stewart Avenue*
HANS LUDWIG WENCESLAS OTTO, Instructor in French,
78 Heustis Street

GREEK.

Office of the department White 3a. Consultation hours as follows : Professor Wheeler, W., F., 10-11 ; Professor Bristol, T., Th., S., 11 ; Dr. Laird, T., Th., S., 9 ; Professor Hammond, M., 12 ; Professor Emerson, at Cast Museum, T., W., Th., F., S., 12.

The courses in Greek may be grouped under four heads : (1) The general and elementary work represented by courses A., 1, 2, and 2a. The course in elementary Greek has been added for the advantage of non-Greek students, who for any reason may have found it desirable, though late in their college course, to acquire a knowledge of the language, and are willing to incur the labor incident to doing two years' work in one. The Freshman work is directed toward training in the accuracies of the language, especially in syntax ; the Sophomore work toward impressing upon the student a sense for the literary standards and the ideas peculiar to the Greeks. (2) The advanced work in study of the literature. Beside the course intended especially for Juniors (3 or 4) there are offered within the scope of two years reading-courses in (a) the orators, (b) the elegiac and lyric poets, (c) the tragedians, (d) Aristophanes, (e) Plato, (f) Aristotle, and a course surveying the literature in general. (3) History and antiquities. Here belong course 9 in Greek, and the courses in archæology and ancient history offered by the departments of archæology and history ; also the course Greek 2a which is largely devoted to the historians. (4) The language, under which head belong courses 13, 14, 15, 16. All students who intend to become specialists in Greek are advised to take, in connection with their reading, the course in advanced composition, if possible, both in the Junior and Senior year. The courses in historical grammar should as a rule be postponed until the Senior year or the graduate years, but Sanskrit may be begun with advantage in Junior year. A year of Sanskrit should precede course 15 (Comp. Philol. 2). Students specializing in Greek are also recommended to take at least one year in Old English. Latin should always be a parallel study with Greek.

A. Elementary Greek. The essentials of the grammar. Simple exercises in composition. The reading of selections from the Anabasis of Xenophon, and the Apology and Crito of Plato. M., W., F., 8, *White 13.* Dr. LAIRD.

This course is designed for students who wish to acquire by extraordinary effort in one year the ability to read Attic prose. It cannot be counted for graduation in the course in Arts.

After a few weeks drill in the essential forms of inflection of the nouns and verbs the class will begin the reading of Xenophon's *Anabasis*, upon which will be based further instruction in the inflexions and a thorough study of all ordinary syntactical constructions. Exercises in Greek composition, based upon the author read, will be assigned daily, and translation at sight will be encouraged from the beginning. In the Spring term the class will be introduced to Plato; rapid reading will be aimed at, and special attention given to the acquirement of vocabulary.

Text books: Moss, *First Greek Reader*, Boston, 1890, (2d ed.); Goodwin, *Greek Grammar*, Boston, 1892, (Revised ed.); Xenophon, *Anabasis I-IV*, with Vocabulary, Goodwin & White, Boston, 1892; *Greek Composition*, Collar and Daniell, Boston, 1893; Plato, *Selections*, Purves, Oxford, 1891.

I. Freshman Course. Lysias. Homer's *Odyssey*. Plato. T., Th., S., 10, *White 6 and 13*. Associate Professor BRISTOL and Dr. LAIRD. The class will be divided into sections on the basis of scholarship at the beginning of the winter and spring terms. See also course 2a.

In the fall term the reading is selections from Lysias. This is accompanied by a careful review of the principles of the normal syntax of Attic prose and especially the syntax of the verb. Exercises in the writing of Greek are given each week either in connection with the text being read at the time, or from some text book on Greek composition. The translation of Greek at dictation is also practiced, and the writing by the class of sentences read by the instructor is occasionally required in order to help the formation of a correct pronunciation. In the winter term selections from the *Odyssey* are read and in connection with the work several lectures are given to the class on the language and style of Homer, and upon some portion of the antiquities. The work of this term is literary rather than grammatical. In the spring term the reading is in the easier portions of Plato, the passages chosen being descriptive and not argumentative. The composition work of the fall term is again resumed. The text books used are Bristol's *Select Orations of Lysias*, Boston, 1892; Merry's *Odyssey*, Books 1-12, Oxford, 1892; Purves' *Selections from Plato*, Oxford, 1891.

2. Sophomore Course. The *Philippics* of Demosthenes. Sophocles' *Antigone*. The *Acharnians* of Aristophanes. Extra reading required; the *Characters* of Theophrastus, the *Iphigenia in Tauris* of Euripides, and the *Plutus* of Aristophanes. Greek composition for two terms. Outline lectures upon the history of Greek literature. M., W., F., 9, *White 6*. Professor WHEELER and Dr. LAIRD.

This course, which ends the required work in Greek, is arranged with some reference to students whose college study of Greek may cease at this point. The central aim is to impress upon the student a sense for Greek literary standards, and to afford him some opportunity of appreciating the ideas and conceptions of life peculiar to the Greeks as revealed in the masterpieces of their literature. Each term a work is assigned for reading outside the class, and an examination is held upon it. No particular text books are required, but the following are most commonly used: Tarbell's *Philippics of Demosthenes*, Boston, 1886; D'Ooge's *Antigone of Sophocles*, Boston, 1886; Flagg's *Iphigenia in Tauris of Euripides*, Boston, 1889; Merry's *Acharnians of Aristophanes*, New York, 1887; Green's *Plutus of Aristophanes*, Cambridge.

- 2a. **Supplementary Courses**; open to Sophomores and to Freshmen who receive the special permission of the instructor. *Hellenica of Xenophon*, Books V and VI. *Herodotus*, Books VII and VIII. Selections from *Lucian*. W., F., 10, *White 6*. Dr. LAIRD.

This course may be taken for one or more terms.

This course is intended for those Sophomores and more advanced Freshmen, who desire to devote to the reading of Greek more time than the number of hours required for the A.B. degree. It should especially be elected by all who purpose to pursue the study of the language in the later years of their course. It affords an opportunity, not otherwise given, to gain an acquaintance with the writings of Herodotus and Lucian, and with portions of Xenophon not frequently read. The aim will be to supplement the more thorough drill of the required courses, and to cultivate ease in translation by the reading of a large amount of each author, and practice in rendering at sight. Text books: *Xenophon, Hellenica V—VII*, Bennett, Boston, 1892; *Herodotus, Book VII*, Butler, Cambridge, 1891, *Book VIII*, Shuckburgh, Cambridge; Selections from *Lucian*, Williams, Boston, 1892.

3. **Junior Course.** *Thucydides*, Books I and II. *Demosthenes on the Crown*. *Aeschylus' Prometheus Bound*. M., W., F., 10, *White 3*. Associate Professor BRISTOL.

4. **Junior Course.** *Thucydides*, Books VI and VII. *Euripides, Medea and Alcestis*. *Demosthenes, on the Peace, and on the Chersonese*. M., W., F., 10, *White 3*. Dr. LAIRD.

Course 4 is omitted in 1894—95.

These courses are given in alternate years and are intended to furnish a third-year reading course for (a) those students who do not intend to specialize in Greek but wish to secure a greater familiarity

with the literature than has been gained from courses 1 and 2, and (b) to students wishing to take further special work in the literature, or the language. In these courses the attention will be concentrated mainly upon the style and subject matter of the works read. The books used are for Thucydides, Book I by Morris, Boston 1887, Book II by Marchant, London, 1891, Book VI and VII by Frost, Oxford, 1881. Aeschylus' Prometheus by Wecklein, translated by Allen, Boston, 1891. Demosthenes on the Crown by Drake, London 1889, on the Peace and Chersonese by Abbott and Matheson, Oxford, 1890. Euripides' Alcestis by Jerram, Oxford, 1885, Euripides' Medea by Allen, Boston, 1887.

5. **Oratory.** Selected orations of Andocides, Lysias, Isaeus, and Demosthenes. Lectures on the development of Attic oratory, and on Athenian legal antiquities. W., F., 9. *White 3.* Associate Professor BRISTOL.

This course is open to those who have passed in courses 1 and 2, and in 3 or 2 a. The aim is to give a view of the development of Athenian legal oratory on its literary and practical sides, and to study the judicial and legal systems of Athens. Besides the reading of large portions of the works mentioned above, typical extracts are read from Antiphon, Isocrates, and Aeschines. The careful study of Blass' and Jebb's works on the Attic orators, and of Meier and Schömann's *Der attischer Process* is recommended. The texts used are those in the Teubner series, and students are advised to have them interleaved when bound.

6. **Elegiac and Lyric Poetry.** Anthologia Lyrica (Hiller). Pindar, selected odes. Lectures and recitations. W., F., 9, *White 3.* Associate Professor BRISTOL.

This course will not be given in 1894-95. The reading of the principal fragments of the elegiac, iambic, and melic poets. The course has primarily a literary and not a linguistic aim. In connection with it lectures are given on the early forms of Greek verse and of Greek music and on their application and growth. The text followed is for the purposes of convenience Hiller's in the Teubner series, and the use of Farnell's Greek Lyric Poetry is advised. In reading Pindar, Gildersleeve's edition is used, New York, 1885.

7. **The Tragedy.** Aeschylus' Oresteian trilogy. Sophocles' Oedipus Tyrannus. Euripides' Hippolytus. Aristotle's Poetics. M., W., F., 10, *White 3.* Associate Professor BRISTOL.

This course will not be given in 1894-95. The careful study of some of the masterpieces of Greek tragedy, together with discussion of the literary history and the scenic antiquities. This is followed

by the reading of the Poetics of Aristotle as an introduction to criticism. Courses 6 and 7 are intended for students who have considerable facility in reading Greek. They may be taken by graduates and by undergraduates who have taken courses 1 and 2, and 3 or 5. The books followed are Wecklein's *Oresteia* of Aeschylus, Leipsic, 1888, and *Hippolytus* of Euripides, Leipsic, 1885; Jebb's *Oedipus* of Sophocles, Cambridge, 1890; Christ's text of the Poetics in the Teubner series.

8. **Aristophanes.** The Knights, Clouds, Wasps, Peace, Birds, Frogs. Lectures on the development of Greek comedy and its scenic representation. T., Th., 8, *White 3*. Dr. LAIRD.

A careful study is made of six plays, two being completed each term. Of the remaining five, the three not read in course 2 are presented to the class with brief comments on the plots, objects of satire, and other matters of interest. Lectures are given on the origin and history of comedy, and its mode of presentation.

No Greek author illustrates so richly as Aristophanes the public and private life of the Athenian people, their social customs, morals, religion, and education. These topics therefore will be dwelt upon, and it is expected that each member of the class will personally investigate some point in this connection, or a question of language or metre, according to preference.

Text books: Knights, Clouds, Wasps, Birds, and Frogs, Merry, Oxford, 1887, '89 (new ed.), '93, '89, and '87; Peace, Green, London, '73; Rogers, London, '67; Ritter, Wolken, Vögel, Frösche, Kock, Berlin, 1882 (3rd ed.), '76 (3rd ed.), '76 (2nd ed.), '81 (3rd ed.); *Comoediae*, Blaydes, Halle, 1880-93; *Scholias*, Dübner, Paris, 1883; Dunbar's *Concordance*, Oxford, 1883; Couat, *Aristophane et l'ancienne Comédie Attique*, Paris, 1889; Haigh, *The Attic Theatre*, Oxford, 1889.

9. **The Private and Political Antiquities of the Greeks.** The first two terms will be devoted to a study of the private life of the Greeks, with illustrations (by lantern views, photographs, etc.) from ancient monuments and remains. The third term will be given to a review of the political institutions of Athens and Sparta. T., Th., 11, *White 6*. Professor WHEELER.

This course includes lectures on the following topics: The physical geography of Greece. Characteristics of the Greek people. The population of Greece. The modern state and people of Greece. Attica. Athens. The Acropolis. Life of the Greek women. Marriage and the wedding. The children. The slaves. The house. Furniture. Clothing. Dress for head and feet. Toilet and the bath. Food and drink. Table usages. Cost of living. Round of daily life. Sickness

and physicians. Death and burial. Society and social entertainment. Religion. Ritual and worship. Theory of education. Schools and teachers. Athletics. Music. Theatre. Dramatic representations. Agriculture and stock. Merchants and trade. Weights and measures. Money. Arts and industries. Travel, roads, inns and conveyance. Army, armor and tactics. Ships. Ancient vs. modern conception of the state. Development of the institutions of the state. Various forms of government. The Spartan state; classes of the people and departments of government. Spartan discipline of life and the policy of the state. Development of the Athenian state. The Athenian democracy. The office-holders. The Athenian town-meeting. The courts. The finances. The state socialism of the fourth century. Relation of states to each other.

The following books are very useful in connection with the course and students are advised to own at least one of them: Smith's Dictionary of Antiquities, 3rd ed., Boston, 1890; Baumeister's Denkmäler aus dem classischen Altertum, Munich, 1888; Göll's edition of Becker's Charicles, 3 vols., Berlin, 1885; Hermann-Blümner, Lehrbuch der griechischen Privatalterthümer, Freiberg, 1882; Müller, I., Die griechischen Privataltertümer in vol. IV of Müller's Handbuch der Altertumswissenschaft, Nördlingen, 1887; Guhl and Koner, Life of the Greeks and Romans, 1883; Blümner, H., The Home Life of the Ancient Greeks, New York, 1893. For the lectures of the third term: Gilbert, G., Handbuch der griechischen Staatsalterthümer, 2d ed., Leipzig, 1893; Schömann, The State (Antiquities of Greece), London, 1880; Busolt, G., Die griechischen Staatsaltertümer, in vol. IV of Müller's Handbuch der Altertumswissenschaft, Nördlingen, 1887.

10. **Plato's Philebus. Aristotle's Nicomachean Ethics.** T., Th.,
10. Assistant Professor HAMMOND.

The first four and last three books of the Ethics and the whole of the Philebus will be translated and interpreted.

In 1895-96. Lectures and interpretations of Aristotle's De Anima and Plato's Republic.

11. **The Metaphysics of Aristotle.** T., 12. Assistant Professor
HAMMOND.

The purpose of this course is to read rapidly through the Metaphysics, and to give students of classical philology and of philosophy an acquaintance with the style and terminology of Aristotelian Greek and with the chief elements of Aristotle's metaphysical system. Text-books: Metaphysics ed. Christ, Leipsic, 1886.

12. **Survey of Greek Literature.** A presentation of the literature through readings in English, accompanied by explanations and lectures. Fall term, Plato; winter term, the lyric poets; spring

term, the *Odyssey* of Homer and Plutarch's *Lives*. Open to students of all courses. M., II, *Morrill* 3. PROFESSORS WHEELER, BRISTOL, EMERSON, HAMMOND, and DR. LAIRD.

Intended to furnish an opportunity for students who have not had Greek to acquire some knowledge of the literature. Standard works on the authors read are recommended for private study, and the reading in translations of works other than those treated in the class-room is suggested and directed. Jebb's *Primer of Greek Literature* is the best general introduction. This course will be given in alternate years with course II in Latin.

13. **Advanced Greek Composition.** Weekly practice in the writing of more difficult Greek. *White* 3. DR. LAIRD.

In this course the students are under the direct personal supervision of the instructor. Translations are prepared weekly, and the work of each member is criticised privately at an hour arranged. The passages assigned are selected with a view to the special needs of the individual members of the class. The attention of the student is directed to the proper rendering of English idioms into Greek, and the correct choice of words; while the more advanced are given passages from English authors for translation in the style of Greek writers of narrative, rhetorical, or philosophical prose.

Text books: Sidgwick, *Introduction to Greek Prose Composition*, Boston, 1885; Sidgwick, *Lectures on Greek Prose Composition*, London, 1889, (2d ed.); Sargent and Dallin, *Materials and Models for Greek Prose Composition*, London, 1889, (3d ed.).

14. **Modern Greek.** Introduction to the grammar. Reading. Lectures on Modern Greek literature. Fall term. W., F., IO. *White* 6. Associate Professor ALFRED EMERSON.

Students familiar with Classical Greek find little difficulty in acquiring a reading knowledge of the modern idiom, and such a knowledge is in several ways a distinct advantage to the specialist. Indeed the classical scholar can hardly afford to remain altogether ignorant of the contemporary development of the Greek language, and of the five millions of people, who in their hereditary use of it find a reasonable guaranty of their Hellenic descent. Vincent and Dickson's *Handbook of Modern Greek*, London, 1881, will serve as an introductory book, and the reading will be from *Atlantis*, a weekly Greek newspaper now published in New York City.

15. **Greek Grammar.** Treated from the historical point of view. Professor WHEELER. See under Comparative Philology, course 2, of which this course is a part.

16. Philological Seminary. The Greek dialects studied from the inscriptions. Special problems of Greek grammar. Preparation and discussion of papers by members of the seminary. W., 3-5, and an additional hour at the pleasure of the instructor. Professor WHEELER.

The work of the seminary for any given year is made to centre about some author or other source of knowledge of the language. In 1894-95 the subject will be the inscriptions; in 1895-96 it will be Homer. Members of the seminary are all required to have some special subject for investigation, usually connected with the general subject occupying the seminary for the year. Reports upon the progress of their work are made every four weeks, and a thesis or a written summary embodying the results of the year's work is required at the close of the year.

GREEK PHILOSOPHY.

History of Greek and Mediæval Philosophy. Lectures and text-book. M., W., 10. Assistant Professor HAMMOND. Philosophy 31.

The general history of Greek philosophy will be rapidly reviewed in the first term of the year; the second term will be devoted exclusively to the history of Greek ethics, in connection with which Well-don's translation of Aristotle's *Nicom. Ethics* and Grant's introductions will be read and discussed; the remainder of the year will be given to the study of scholastic philosophy from Scotus Erigena on. As text-book Windelband's *History of Philosophy* will be used, New York, 1893.

Selected Dialogues of Plato and the Metaphysics of Aristotle (English translations.) Lectures, analyses, and criticisms. T., S., 11. Assistant Professor HAMMOND. Philosophy 32.

The Dialogues selected for 1894-95 are the *Republic*, *Protagoras*, *Gorgias*, *Phaedrus*, *Theaetetus*, *Sophist*, *Statesman*, *Philebus*, *Symposium*, *Apology*, *Crito*, and *Phaedo*. Students will prepare analyses and criticisms of the several dialogues and of the separate books of the *Metaphysics*, and will read specified parts of Zeller's larger work on Greek Philosophy. Text-books: Jowett's *Dialogues of Plato*, London, 1892, and MacMahon's translation of the *Metaphysics*, Bohm Library; for students who read German, Bonitz's translation of the *Metaphysics* is preferred.

LATIN.

The aim of the work in Latin is in general, to give the student a wide and accurate knowledge of the essential features of Roman thought and character as revealed in the literature and the monumental remains. To this end the best literary masterpieces, Cicero, Livy, Horace, Terence, and Tacitus are made the basis of the required work of the freshman and sophomore years. While, however, the main aim is literary, constant attention is paid to the language, and the writing of Latin is made a regular exercise during the freshman and sophomore years.

To those who elect Latin in the Junior and Senior years ample opportunity is afforded for wider reading. Courses are offered in Plautus, Terence, Lucretius, Catullus, Pliny (the Letters) Juvenal, Tacitus; also in Cicero's Letters and the *De Oratore*. The history of Roman literature receives detailed treatment in a course of lectures running through the spring term, in alternate years.

To afford a more thorough and sympathetic knowledge of Roman life than the courses in literature alone would offer, a systematic course of lectures on private antiquities is given in alternate years. These lectures are abundantly illustrated, mainly by lantern views and photographs prepared from the remains of Roman civilization preserved in Pompeii, Herculaneum, Rome, and elsewhere.

To students whose interest extends to the scientific aspects of the language (and especially to those who are preparing to be teachers) ample provision is made by the Teacher's Training Course and by the exercises of the Latin Seminary. In the Latin Seminary attention is devoted to the language, both on its formal and syntactical sides. A study of the Italic dialects (Latin, Oscan, Umbrian) from inscriptions, alternates with a study of Latin Syntax.

Special courses in Latin writing for advanced students, in sight reading, and in palaeography, are also offered.

1. **Livy. The De Senectute of Cicero. Horace.** Selections from the Odes. **Latin Writing.** In four sections. M., W., F., 9, *Morrill 3*. Professor BENNETT. M., W., F., 10, *Morrill 11*, Assistant Professor ELMER. M., W., F., 9, *White 10*. Mr. EDMISTON. M., W., F., 11, *White 10*. Mr. EDMISTON.

Without neglecting necessary attention to the language, chief stress is laid upon a sympathetic literary interpretation of the works read. To this end the practice of translation into the best English is carefully cultivated. Weekly exercises in Latin writing accompany the course.

Text books: Westcott's or Greenough's *Livy*; Reid's *de Senectute*; Shorey's or Smith's *Odes of Horace*.

2. **The Phormio of Terence.** **Horace:** Selections from the Epodes, Satires, and Epistles. Translation at sight. **Tacitus'** *Dialogus de Oratoribus*. Collateral reading upon the history of Rome during the period covered by the life of Horace. Latin writing. Wilkins' *Primer of Roman Literature*. In two sections. T., Th., S., 9; T., Th., S., 10, *Morrill II*. Assistant Professor ELMER.

Open to students who have completed course 1.

During the first term the *Phormio* of Terence is read, somewhat critically, and the *Adelphoe*, or some other play of Terence is translated at sight. The second term and part of the third are devoted to selections from the Epodes, Satires and Epistles of Horace. The remainder of the year is devoted to the *Dialogus de Oratoribus* of Tacitus, with reference to its subject matter, its stylistic features and its general historical interest. An exercise in the writing of Latin is held once a week throughout the year.

Text books: *Phormio*, Sloman; Horace: Epodes, Smith; Satires and Epistles, Greenough, Kirkland, or Wickham, (Chase's Horace may be used as a convenient edition of the entire works of Horace); *Dialogus*, Bennett; Latin Writing, Preble and Parker; Roman Literature, Wilkins, and the larger works of Teuffel and Cruttwell.

3. **Selections from Cicero's Letters.** **Cicero, De Oratore.** Assistant Professor ELMER. W., F., 11. *Morrill II*.

The course is open to students who have completed course 1, and is especially recommended to those who may be planning to elect Latin later.

While the letters of political interest are not neglected, special attention is given to the study of the character of Cicero as a private man in his family and among his friends. The *De Oratore* is studied chiefly with reference to its subject matter, and is intended as a general introduction to the rhetorical productions of Cicero.

Text books: Cicero's Letters, Muirhead and the smaller work (Cicero in his Letters) of Tyrrell; *De Oratore*, Wilkins.

4. **Selections from the Republican Literature; Plautus, Lucretius, Catullus.** Lectures on the History of Roman Literature. T., Th., S., 9. Professor BENNETT.

The *Captivi* of Plautus is read first and is followed by the *Mostellaria*. Special attention is paid to the diction and metres. Large portions of the Latin text of the *Captivi* are read aloud from day to day, and when the play is finished it is translated rapidly in two consecutive sessions. Lectures are given on the origin and literary history of Roman comedy, including the mode of scenic presentation.

Lucretius is read both as a poet and a philosopher. With this is combined a study of Epicureanism from other sources, along with some notice of contrasting philosophical systems. Catullus, while receiving briefer attention than Plautus or Lucretius, is read in representative lyric, heroic, and elegiac poems.

The spring term is devoted to a systematic course of lectures on the origin and development of Roman literature, and its history down to the close of the Augustan Age.

Text-books: Hallidie's or Lindsay's *Captivi* of Plautus; Sonnenschein's *Mostellaria*; Kelsey's *Lucretius*; Merrill's *Catullus*.

5. **The Literature and History of the Early Empire: Pliny the Younger, Juvenal, and Tacitus.** History of Roman Literature; Capes' *Early Empire*. T., Th., S., 9, *Morrill* 3. Professor BENNETT.

Course 5 will not be given in 1894-95.

Pliny's Letters are read in the fall term, especially those bearing upon the contemporary literary life of Rome. The winter term is devoted to Juvenal. In connection with this author Cape's *Early Empire* is read, and considered in weekly discussions. The class are also encouraged to pursue collateral reading in the larger histories, as Merivale's. The spring term is devoted to a reading of the early books of Tacitus' *Annals*, with reference not only to the subject matter but to the peculiarities of language and style characteristic of this author.

Text-books: Prichard and Bernhard's *Pliny*; Hardy's *Juvenal*; Allen's *Tacitus*.

6. **Advanced Course in Latin Writing.** Open to students who have completed course 2, and, by special permission, to others. S., 11, *Morrill* 11. Assistant Professor ELMER.

The aim of this course is to inculcate some appreciation of Latin style and to give the student as much facility as possible in thinking in Latin without reference to the English. Original orations and essays are written by the students, and read and discussed before the class. Students thus get considerable training in understanding Latin at hearing. In connection with this work parts of Cicero's orations are studied with special reference to their stylistic features.

7. **Teacher's Training Course:**

(a) Study of the evidences for the pronunciation of Latin. Hidden quantities. Peculiarities of orthography. Original force and historical development of the cases. The subjunctive, with special reference to its primitive meaning and the history of its development in subordinate clauses. W., 12.

(b) Practical exercises in the study of the Grammar, Caesar, Nepos, Cicero, and Vergil. F., 12.

Of this course, (a) may be taken without (b), but (b) may not be taken without (a). The general aim of the course is to prepare students who intend to teach to enter upon their first year of work with confidence. Professor BENNETT.

8. **The Private Life of the Romans.** A systematic consideration of the constitution of the Roman family, status of women, marriage, children, education, slavery, the Roman house and its furniture, food, dress, baths, games and amusements, books, trade, travel, religion, death, burial, etc. Lectures, copiously illustrated by lantern views, photographs, and material in the Museum of Casts. W., F., 12. *Morrill 3.* Professor BENNETT.

Open to students of the sophomore, junior, and senior years.

Course 8 will not be given in 1894-95.

9a. **Latin Seminary.** Study of special chapters in the syntax of the Latin cases. Preparation of papers by members of the seminary. Occasional sessions of the seminary will be devoted to the consideration of current periodical literature in the field of Latin. T., 3-5. Professor BENNETT.

9b. **Latin Seminary.** Study of the Italic Dialects (Latin, Oscan, Umbrian) in inscriptions, with special reference to the sounds, inflexions, and word-formation of the Latin language. Discussion of disputed Latin etymologies. Professor BENNETT. T., 3-5.

Text-books: Schneider, *Dialectorum Italicarum Exempla Selecta*, Leipsic, 1886; Buck, *Vokalismus der Oskischen Sprache*, Leipsic, 1893; Zuetiaeff, *Inscriptiones Italiae Inferioris Dialecticae*, Moscow, 1886; Buecheler, *Umbrica*, Bonn, 1883.

The object of the seminary is to familiarize its members with the methods and habits of independent investigation; the work therefore, so far as possible, is thrown into the hands of the students themselves. The seminary is open to graduates, and by special permission to undergraduates of superior attainments. Students intending to take these courses should confer with the instructor before Commencement, that the necessary books may be ordered from abroad in due season. 9a and 9b are given in alternate years.

10. **Reading of easy Latin at sight.** Selections from Nepos, Gellius, and Ovid. This course is intended especially for freshmen. S., 8, *Morrill 3.* Mr. EDMISTON.

This course is intended to give underclassmen an opportunity of learning to read at sight with facility Latin prose and verse of aver-

age difficulty. In the first term, the class reads selected stories from Aulus Gellius, who furnishes interesting subject-matter, and whose style, on account of his studied imitation of earlier writers, is not far from the classical standard. The more important biographies of Cornelius Nepos are read in the second term, and selections from Ovid, especially from the *Metamorphoses*, in the third.

11. Lectures on the History and Scope of Latin Study. The object of this course is to acquaint the student in a general way with the different fields of Latin study, the present state of knowledge in each, and some of the more important problems still awaiting solution. The series is open to all, and is recommended to students of the lower classes as well as to those more advanced. One hour. M., 11, *Morrill* 3. Not given in 1894-95.

The following subjects will be treated :

History of Latin Studies since the Renaissance, three lectures.
Professor BENNETT.

The Latin Language, two lectures. Professor WHEELER.

Latin Literature, three lectures. Assistant Professor ELMER.

Roman History, three lectures. Professor BURR.

Roman Philosophy, three lectures. Assistant Professor HAMMOND.

Roman Law, three lectures. Assistant Professor WILLCOX.

Roman Religion, two lectures. Professor C. M. TYLER.

Roman Architecture, Sculpture, Coinage, etc., three lectures. Assistant Professor EMERSON.

Roman Military and Naval Antiquities, two lectures. Mr. EDMISTON.

Roman Epigraphy, one lecture. Professor BENNETT.

Roman Palæography, one lecture. Professor BURR.

Roman Lexicography, one lecture. Professor BENNETT.

Relation of English Literature to Roman, two lectures. Professor CORSON.

15. Latin Palæography. An actual study of Mediæval manuscripts and fac-similes in the possession of the University. Winter. W., 4-6. Professor BURR.

For Latin Grammar with reference to the history of sounds and inflections see under Comparative Philology, Course 9.

For Roman Art, Roman Topography, etc., see under Classical Archæology, Course 2.

For Roman History, see under Ancient History.

1. **Ancient Greece and Rome.** Lectures and examinations. Fall term, Greece. Winter and Spring terms, Rome. T., Th., 9. Professor BURR.

An elementary survey of the history of the Greco-Roman world, intended as an introduction for those having no knowledge of the subject and as a thorough review for those already familiar with it. A text book is used, and examinations upon the knowledge thus gained alternate with the lectures. The aim of the latter is to give the student a broader view of the topic, and at the same time to direct his attention to the sources of our knowledge. The course is a required one for students in the classical courses; it may be elected by others. The class may be entered at the beginning of the Winter term, but not later.

7. **An Introduction to the Study of History.** *a.* History: its scope, its materials, its methods. *b.* The sciences auxiliary to history. *c.* Historical geography. S., 12. Professor BURR.

The lectures of the first term deal especially with historical method and are enforced by practical exercises in its use. Those of the second point out the use to history of the leading auxiliary sciences—Anthropology, Ethnology, Archæology, Philology, Palæography, Diplomatics, Sphragistics, Numismatics, Heraldry, Genealogy, Chronology, Geography—discussing the methods and aims of each and attempting a brief summary of their historical results. Those of the third term treat more fully the last-named of these sciences in its relations to History. This course alternates with the following, and will not be given in 1894-95.

8. **The Beginnings of History.** *a.* The Dawn of history. *b.* Oriental history: to the advent of the Aryan peoples. *c.* Oriental history: to the conquests of Alexander. S., 12. Professor BURR.

COMPARATIVE PHILOLOGY.

The work in the department of comparative philology is arranged with a view primarily of serving the needs of those who intend to be teachers of language. In coöperation with the linguistic work of the departments of Greek, Latin, English Philology and Romance Languages, it seeks to illustrate the modern historical treatment of the languages included in the field of these departments, as well as of the Indo-European languages as a whole, and also to furnish a background for the understanding of linguistic phenomena in general by discussion of the principles involved in the life and growth of language. It looks also toward the training of specialists in the work of philological research through the work of the seminaries as well as that connected with the more advanced special courses. An opportunity is afforded each year for beginning the study of Sanskrit and advanced work in this and other fields is arranged, independently of the courses announced, so as to meet the needs of particular students.

I. General Introduction to the Science of Language. The chief principles of the life and growth of language; outlines of the science of phonetics; history of the science of comparative philology; historical and ethnological results of the science; classification of languages; salient characteristics of the various branches of the Indo-European family of languages; methods of investigation. M., 12. *White 6.* Professor WHEELER.

This course is intended to serve as an introduction to the scientific study of language. It undertakes no systematic treatment of the material of historical grammar, such as phonology, stem-formation, derivation, composition, inflexion, and syntax, but rather concerns, itself with the general principles involved, with the history of methods, the survey of the field of work, and reference to the tools and sources of research. It is intended for students in every line of linguistic study as well as secondarily for students of psychology and the history of thought. The principles discussed are illustrated so far as possible from the history of the English language and from the phenomena of the living language.

Constant reference will be made to the following hand-books: Paul, H., *Principles of the History of Language*, New York, 1889; Strong-Logeman-Wheeler, *Introduction to the Study of the History of Language*, London, 1891; Wheeler, B. I., *Analogy and the Scope of its Application in Language*, Ithaca, 1887; Sweet, H., *Primer of Spoken English*, Oxford, 1890; Delbrück, B., *Introduction to the Study of Language*, Leipsic, 1882; Vietor, W., *Elemente der Phonetik*, Heilbronn, 1887; Sweet, H., *New English Grammar*, Oxford, 1892; von der Gabelentz, G., *Die Sprachwissenschaft*, Leipsic, 1891. The read-

ing of the following is also recommended: Whitney, W. D., *Life and Growth of Language*, New York, 1891; *Language and the Study of Language*, New York, 1880; Sayce, A. H., *The Principles of Comparative Philology*, fourth edit., New York, 1893; Schrader, O., *Pre-historic Antiquities of the Aryan Peoples*, London, 1890.

2. Comparative Grammar of the Greek and Latin Languages.

Historical treatment of the sounds and inflexions of the Greek and Latin in their relation to the other Indo-European languages.

T., Th., S., II, *White 6*. Professor WHEELER.

Not given in 1894-95.

The introductory lectures of this course review the characteristics of the various Indo-European languages. Then follows a systematic treatment of Indo-European phonology with special reference to the Greek, Latin, and Teutonic languages, and in the third term a discussion of stem-formation, composition, and inflexion. Syntax is treated only incidentally. The most important books of reference are: Brugmann, K., *Comparative Grammar of the Indo-Germanic Languages*, New York, 1888-91; Brugmann, K., *Griechische Grammatik* and Stolz, F., *Lateinische Grammatik*, in vol. ii of Müller's *Handb. der Altertumswissenschaft*, 2d edit., Nördlingen, 1889; Meyer, G., *Griechische Grammatik*, 2d edit, Leipzig, 1886; Schweizer-Sidler, H., *Grammatik der latein. Sprache*, Halle, 1888; King and Cookson, *Sound and Inflexion as illustrated in the Greek and Latin Languages*, Oxford, 1888; Henry, V., *Comparative Grammar of Greek and Latin*, New York, 1890. For reference on the side of Teutonic grammar are especially recommended: Wilmanns, W., *Deutsche Grammatik*, Strassburg, 1893-94; Mayhew, A. L., *Synopsis of Old English Phonology*, Oxford, 1891; Kluge, F., *Etymologisches Wörterbuch der deutschen Sprache*, 5th ed., Strassburg, 1894; Kluge, F., *Vorgeschichte der altgerm. Dialekte*, Paul's *Grundriss I*, 300 ff.

3. Elementary Sanskrit. The first twenty-five lessons of Perry's *Sanskrit Primer*; the essentials of the grammar, given in the form of lectures; reading of selections from Lanman's *Reader*. The writing of simple exercises in Sanskrit. T., Th., 9, *White 3*. Associate Professor BRISTOL.

4. Advanced Sanskrit. Reading of selections from the *Rig-Veda*. Grammatical discussions. Lectures upon the private and religious antiquities of the ancient Hindoos. Fall term. W., F., II, *White 6*. Professor WHEELER.

A portion of the hymns contained in Lanman's *Reader* will be read, and later if the course be continued beyond the first term, Aufrecht's editions of the *Rig-Veda* will be used and selections made from a larger range. The time of the course is fairly divided between

grammatical work, interpretation, and a study of the religion and life. Books of reference: Grassman, H., *Wörterbuch zum Rig-Veda*, Leipsic, 1873; Whitney, W. D., *Sanskrit Grammar*, 2d edit., 1887; Zimmer, H., *Altindisches Leben*, Berlin, 1879; Lassen, C., *Indische Alterthumskunde*, new ed., 1894; Kaegi, A., *The Rig-Veda*, Boston, 1886; Barth, A., *The Religions of India*, London, 1882.

5. **Gothic Grammar.** Lectures on the relation of the Teutonic languages to the Indo-European parent-speech. Winter and Spring terms. W., F., 11, *White 6*. Professor WHEELER. See also English course 7a, which should precede this, if possible.

Gothic grammar is treated in this course as a branch of Indo-European grammar, and a knowledge of the language is assumed from the beginning. The phonology and the inflexions are treated systematically, with a view to connecting our own group of languages, especially English, with the history of the other Indo-European branches. Books used in connection with the course: Braune, W., *Gothic Grammar*, London, 1883; Balg, G. H., *Comparative Glossary of the Gothic Language*, Mayville, 1887-89; Wright, J., *Primer of the Gothic Language*, Oxford, 1892; Bernhardt, E., *Vulfila*, Halle, 1875; Brugmann, K., *Comparative Grammar of the Indo-Germanic Languages*.

6. **Balto-Slavic Grammar.** Study of Old Bulgarian from Leskien's *Handbuch der altpulgarischen Sprache*. Spring term. T., Th., 12. Professor WHEELER.

Not given in 1894-95.

This course affords an introduction to Balto-Slavic grammar. The sounds and inflexions of Old Bulgarian are studied in close comparison with the Lithuanian, and are explained in terms of Indo-European grammar. Leskien, A., *Handbuch der altpulgarischen Sprache*, 2d ed. Weimar, 1886; Miklosich, F., *Etymologisches Wörterbuch der slavischen Sprachen*, Vienna, 1886; Kurschat, F., *Grammatik der littauischen Sprache*, Halle, 1876.

7. **Philological Seminary.** The Greek dialects studied from the inscriptions. Special problems of Greek historical grammar. Preparation and discussion of papers by members of the seminary. W., 3-5, and an additional hour at the pleasure of the instructor. Professor WHEELER. See for description of this course under Greek 16.

ENGLISH PHILOLOGY.

7. **Early English Philology.** Formation of the English Language. M., W., F., 9; *Morrill 22*. Professor HART.

a. Fall term. The Gothic Language; Balg's translation of Braune.

b. Winter and Spring terms. Sievers, *Old English Grammar*; Bright, *Anglo-Saxon Reader*.

Course *a* is introductory and is planned with regard also to students in Comparative Philology, in Old and Middle High German and in Old Saxon. Such students are not required to pursue course *b*.

The aim of the course is to lay the foundation for the systematic study of English philology. In the fall term the students investigate the forms of the Gothic language, and the general features of *Ablaut*, as they occur in the verb-system of Teutonic speech. Also the most general features of consonant-shifting from Indo-European to Teutonic. In the winter and spring terms they investigate the specific English vowel and consonant systems, the conjugation and declension, and the metrical system according to Sievers. The quantity of texts read is not large, but is enough to illustrate the grammatical and metrical peculiarities of the language.

8. **Seminary in English Philology.** Open to students who have passed in course 7. Reading of longer Early or Middle English texts, with investigation of dialectal peculiarities. Hours and work to be arranged with each student. *Morrill 22.* Professor HART.

Students in this course review the grammar, noting dialectal peculiarities in the texts read, and accumulating material for graduation theses. Thus far the texts critically examined have been the Beowulf (twice), the Elene and Andrew (in part), and the English Bede (Miller's edition).

9. **Middle English Philology.** Open to students who have passed in course 7 or its equivalent. Further development of the language, readings from Middle English texts, and lectures on Middle English grammar. M., W., F., 11; *English Seminary.* Assistant Professor O. F. EMERSON.

Special attention is given in this course to the study of the Midland dialect of England or the immediate predecessor of Modern English. Selections, however, from the Northern and Southern dialects will also be used to illustrate the more prominent dialectal peculiarities. During the Spring term the readings will be mainly in the literature of the fourteenth century, particularly of authors other than Chaucer. In order to secure a large number of selections the text-books of the fall and winter terms will be Specimens of Early English, Parts i and ii, by Morris and Skeat, Oxford, 1887, 1889.

Courses 7, 8, and 9 comprise a systematic treatment of the history of the language from the beginning down to and including Chaucer, and are planned with regard to the needs of those who wish to teach English grammar scientifically. Undergraduates are earnestly advised to begin the study in their junior year. Application for admission should be made to the head of the department before the summer vacation.

10. **History of the English Language.** Open to all members of the University. Lectures and recitations upon the development of the language down to the present day, with an outline of its changes in sounds, forms, and syntax. Designed for teachers and other persons not making a special study of philology. M., W., 12; *White 2*. Assistant Professor O. F. EMERSON.

The course includes an introduction on the relation of English to other Indo European languages; a short account of the three great periods of English linguistic history, and the main influences affecting the speech; a history of the English vocabulary, including the native and foreign elements; a brief history of English sounds, and the principles of English etymology, besides a somewhat fuller account of English inflexions. The history of English syntax is also illustrated.

11. **Phonetics with special reference to English.** Fall term; Sweet's Primer of Phonetics, with supplementary lectures. Winter and spring terms; Sweet's Primer of Spoken English, with special study of American English. F., 12; *White 1b*. Assistant Professor O. F. EMERSON.

The aim of the course is to emphasize the importance of phonetics in linguistic study, the actual work and the illustrative material having special relation to English. The second and third terms will be devoted to the history of English sounds and to American English in its relation to the English of Great Britain. For the latter work the special text-book will be Sweet's History of English Sounds, Oxford, 1888.

12. **Old Saxon.** Open to students who have passed in 7a. Assistant Professor O. F. EMERSON. Winter and spring terms; Behaghel-Gallée, *Altsächsische Grammatik*; readings from the *Heliand*. Hours to be determined hereafter.

13. **Icelandic.** Open to students who have passed in course 7a. Professor HART. Winter and spring terms; Noreen, *Altisländische Grammatik*; readings from the *Elder Edda*. Hours to be determined hereafter.

The object of Course 13 is to impart some practical knowledge of Icelandic for the purpose of comparison with English; also to afford insight into the peculiar mythological conception underlying the poetry of the *Edda*.

14. **Germanic Philology.** Open to students who have passed in course 7 or in Comparative Philology 1 or 2. Lectures upon the Germanic elements in Brugmann's *Grundriss*. Hours to be determined hereafter. Professor HART.

In course 14 an effort is made to bring together such of Brugmann's

generalizations concerning Indo-European vowels and consonants, word-formation, and inflexion, as are directly available for the study of Gothic, English, German, and Icelandic, and to reconstruct the primitive forms of Teutonic from which the actual forms have been evolved.

Through the acquisition of the Zarncke collection the facilities for the study of English, German, and Icelandic philology are practically complete. The English and German seminary rooms, in which are kept the texts, dictionaries, and grammars most in demand, are open from 8 A. M. to 9.30 P. M. to all graduate students specializing in philology. Other works are always procurable from the general library on demand.

THE ROMANCE LANGUAGES.

6. **Origin and development of the French language and literature down to the XVIIth century.** Lectures. S., 9. *White 12.*
Professor CRANE. Open to those who have had courses 1 and 2.

The object of this course is to give a rapid survey of the field of study and of the principal guides to its various divisions. The Romanization of the provinces, especially Gaul (see Budinszky, *Die Ausbreitung der Lateinischen Sprache über Italien und die Provinzen des römischen Reiches*), the nature of the Latin introduced into the provinces (see Schuchardt, *Vocalismus des Vulgärlateins*, and Meyer in Gröber's *Grundriss*), the Germanic invasion (see Kluge in Gröber's *Grundriss*) and the subsequent modification of the language (see Brunot, *Grammaire historique de la langue française*) are some of the topics treated. For the literature the student is referred to G. Paris, *La littérature française au moyen âge*, Darmesteter and Hatzfeld, *Le Seizième siècle en France*, and for a general survey of the whole field, Lintilhac's *Précis historique et critique de la littérature française*. In the lectures only the great classes of literature such as the epic, drama, lyric poetry, etc., are rapidly characterized.

8. **Romance Seminary.** Phonetics, early French and Provençal texts, etc. T., Th., 9. *French Seminary Room.* Mr. OTTO.
Open only to students in Arts and Philosophy who have had courses 1, 2. (The hours may be changed if found desirable.)

The subject is treated from the standpoint of Comparative Romance Philology.

(a) The essentials of historical French grammar (Phonetics and morphology of the langue d'oïl. Interpretation of the earliest French documents and selections from the *Chanson de St. Alexis*, the *Chanson de Roland*, and *Li dis dou vrai aniel*).

(b) Historical treatment of the sounds and inflexional system of the Old-Provençal language. Reading of selections from Bartsch's *Chrestomathie provençale*.

CLASSICAL ARCHÆOLOGY AND HISTORY OF ART.

The courses in this department are entirely elective, but generally presuppose such an acquaintance with the Greek and Latin languages and literatures, and with ancient history as students who have completed the earlier courses in classics possess. The course in the history of ancient architecture is, however, planned primarily for technical students. Course 1 is the best introduction to the studies of the department, and also connects directly with the courses on private life, which are offered in the Latin and Greek departments. The newly organized University Museum of Classical Archæology effectively equips the department with the means of studying and appreciating the beauties, spirit, and meaning of ancient art. Lantern slides, charts, and other materials enable the instructor to accompany his systematic courses with the needed illustration. All members of the University are encouraged to make the utmost use of these facilities of the department. The Curator of the Museum is present for personal consultation at regular hours.

1. **Classical Archæology.** Fall term; history, scope, and methods of archæological science, especially as dealing with the remains of ancient civilization (ruins and antiques) in the Mediterranean countries; the art of the ancients in tissues, pottery, metal work, including coinage, wood and ivory carving, stone and gem carving, and color, with particular reference to classical architecture, sculpture, and painting. An illustrated course. Winter term; the topography and archæology of Greece, more especially of Athens and Olympia. Spring term; topography and archæology of Italy, especially of Rome and Pompeii. W., F., 11, *Morrill* 3. Associate Professor ALFRED EMERSON.

This course should be taken only by classical students, who are beyond finding a particular difficulty in frequent references to the text of Greek and Latin authors, or the multitude of proper names, etc. There should be previous familiarity with classical geography and history, public and private antiquities, and the literatures of Greece and Rome, as well as the ancient languages. The aim of the course is to introduce students who have completed or nearly completed an undergraduate course in Arts to the materials and methods of specifically archæological information and research, and to equip future classical teachers in this direction.

2. **History of Architecture.** Ancient. M., W., F., 10. Fall term.
For mediæval, renaissance, and modern, see under Architecture
Professor BABCOCK.

In this course, which is open to students in the other general courses as well as to those engaged in the professional study of architecture, the leading ancient styles (Egyptian, Assyrian, Persian, Greek, and Roman) and forms of architectural construction and design are discussed with unusual fullness of illustration and comparison. It offers the classical student a thorough, though rapid, survey of a subject of which he can ill afford to be ignorant, assisting him at the same time in obtaining a certain amount of technical insight.

3. **History of Sculpture from antiquity to the present day.** An illustrated course. Fall term; antique and early christian period. Winter term; mediæval period and Italian Renaissance. Spring term; modern sculpture. T., Th., 10, *Morrill* 3.
Associate Professor A. EMERSON.

The scope of this course is altogether historical and critical. In the opening term, the Museum of Classical Archæology furnishes the best possible opportunity of approaching the sculptured work of the ancient masters in the most direct manner. In the two subsequent terms photographic illustration will be the only resource. Toward the close, the work of the French school will naturally receive the greatest amount of attention.

4. **History of Painting from antiquity to recent times.** An illustrated course. Fall term; antique and early christian period. Winter term; mediæval period and Italian Renaissance. Spring term; modern painting.

Not given in 1894-95.

The illustration of this course is in the nature of things far less adequate than that of the parallel course in sculpture, owing to the difficulty of securing and presenting adequate reproductions of the texture and color of the originals, on which their effect so largely depends. An additional difficulty is created by the absolute destruction of the celebrated paintings of antiquity, whereas for the later development of the art of painting the very abundance of materials is apt to prove confusing. The character of the course as a whole will for this reason be varied from a maximum of discussion with a minimum of illustration at the outset to the exact reverse toward its close.

5. **Studies in the Museum of Casts.** A peripatetic introduction to the large University collection of plaster casts from the antique; will serviceably supplement the above courses, or may be taken independently. S., 11, through the year. Associate Professor A. EMERSON.

The purpose of this course is to approach the works of ancient plastic art directly, the instructor offering in the presence of each group of sculptures or single statue, bust, and bass-relief only so much of information and commentary as may be likely to give precision to aesthetic enjoyment. Mythology, the differences of national styles and of local schools of sculpture in antiquity, the characteristic problems and their solution in different branches of sculpture, the works and influence of the great masters, were among the subjects considered in this way in 1893-4. In each term participants in the course prepare an essay on a noted work or group, from personal impressions.

6. **Archæological Seminary.** A training course for classical students sufficiently conversant with Greek and Latin literature. Fall term; archæological readings in classical authors and modern publications. Winter term; exercises in the interpretation of monuments, and thesis work. Spring term; practical and individual work. M., 3-5. Associate Professor A. EMERSON.

This work is intended primarily for advanced classical students, who contemplate adding some thorough training in archæology to their acquirements in the linguistic and historical branches of classical scholarship. The object of the course as a whole is to place the student in a position to conduct independent investigation along lines pertaining to classical archæology and art.

7. As curator of the Museum of Casts, Dr. Emerson will at regular hours be ready to meet students and others wishing direction in the study of the collection under his charge. The Museum is as a rule open daily from 12 to 5. The curator will be in his office at the Museum daily except Monday from 12 to 1.

FACILITIES FOR STUDY.

THE UNIVERSITY LIBRARY.

The Library contains one hundred and fifty thousand volumes, besides some twenty-seven thousand pamphlets. It is made up largely of the following collections, increased by annual additions of from three thousand to five thousand volumes. THE ANTHON LIBRARY, of nearly seven thousand volumes, consisting of the collection made by the late Professor Charles Anthon, of Columbia College, in the ancient classical languages and literatures; THE BOPP LIBRARY, of about twenty-five hundred volumes, relating to the oriental languages and literatures and comparative philology, being the collection of the late Professor Franz Bopp, of the University of Berlin; THE GOLDWIN SMITH LIBRARY, of thirty-five hundred volumes, comprising valuable editions of the ancient classics; THE RHÆTO-ROMANIC COLLECTION, containing about one thousand volumes, presented by Willard Fiske in 1891; THE PRESIDENT WHITE HISTORICAL LIBRARY, of about twenty thousand volumes (including bound collections of pamphlets) and some three thousand unbound pamphlets, the gift of ex-President White, received in 1892, especially rich in the primary sources of history. The valuable library of the late Professor F. Zarncke of Leipsic, containing about thirteen thousand volumes and pamphlets, especially rich in Germanic philology and literature.

As a working library in the fields of classical and comparative philology the University collection is one of rare excellence and completeness. It is particularly rich in periodical literature, possessing complete sets of all current philological journals as well as of the transactions of the chief learned societies. The editions of classical writers, both critical and exegetical, are very completely presented, including many old editions of great value. In the fields of Comparative Philology and of Greek and Latin grammar the equipment is practically complete, both in the earlier and the more recent literature. Latin syntax is represented with great completeness in the widely scattered monographic literature so difficult to bring together.

The University Library Building embodies every modern principle of library construction. It is heated by steam from the central heating station, is provided with a thorough system of artificial ventilation and fully equipped with incandescent electric lights. The reading room contains ample accommodation for two hundred and twenty readers, and the open bookcases around its walls provide shelf-room for a carefully selected reference library of eight thousand volumes. All the various rooms of the building are open every week day from 8 a. m. to 9.30 p. m., except on Saturday, when they are closed at 5 p. m.

THE GREEK AND LATIN SEMINARY ROOM.

A large room in the University Library Building is set apart as a special work-room for the advanced students in Greek and Latin. Each student who is admitted to the privileges of the room is assigned a regular seat at one of the tables, which becomes his place of work for the year. The room accommodates about thirty students. It is open from 8 a. m. till 9.30 p. m., and is lighted in the evening. The books which are permanently deposited in the room number at present about two thousand, but besides these there are temporarily transferred to the room from the general library a large number of books to meet from time to time the needs of the work in the seminaries. The student is able therefore, to do his work in direct connection with a specially selected reference library of about 2,500 volumes. The permanent book-equipment of the room includes the following complete series of journals and serial publications: (1) *Rheinisches Museum*, *Hermes*, *Amer. Journal of Philology*, *Journal of Philology*, *Jahrbücher für Philologie und Pädagogik*, *Neue Jahrbücher*, *Philologus*, *Philologischer Anzeiger*, *Journal of Hellenic Studies*, *Rivista di Filologia Classica*, *Revue de Philologie*, *The Classical Review*, *Mnemosyne*, *Berliner Philologische Wochenschrift*, *Jahresbericht über die Fortschritte der class. Altertumswiss.*, *Amer. Journal of Archæology*, *Archäologische Zeitung*, *Revue Archéologique*, *Mittheilungen des deutschen Archäol. Instituts zu Athen*, *Bulletin de correspondance Hellénique*, *Papers of Amer. School of Class. Studies*, *Kuhn's Zeitschrift*, *Bezenberger's Beiträge*, *Mémoires de la Société de Linguistique*, *Kuhn und Schleicher's Beiträge*, *Brugmann-Osthoff*, *Morpholog. Untersuchungen*, *Brugmann-Streitberg*, *Indogerm. Forschungen*, *Techmer's Internat. Zeitschrift*, *Wölfflin's Archiv für latein. Lexicographie*, *Curtius' Studien*, *Leipziger Studien*, *Wiener Studien*, *Breslauer Philol. Abhandlungen*, *Berliner Studien*, *Dissertationes Philol. Argentoratenses*, *Dissertationes Philol. Halenses*, *Commentationes Jenenses*, *Harvard Studies*, *Cornell Studies*, *Kießling-von Wilamowitz*, *Philol. Untersuchungen*, *Ephemeris Epigraphica*, *Schanz*, *Beiträge zur histor. Syntax*. In the adjoining seminary rooms of the French, German, and English departments, to which the members of the Greek and Latin seminaries also have access, are found sets of various other important journals, such as the *Germania*, *Zeitschr. für deutsches Altertum*, *Paul und Braune's Beiträge*, *Anglia*, *Romania*.

(2) A large and approximately complete collection of dictionaries and lexicons of the classical languages, including concordances, indexes, special lexicons, etymological dictionaries, dictionaries of antiquities, geography, biography, as well as a collection of standard dictionaries of other languages, as Sanskrit, German, French, Italian, English, etc.

(3) Collections of Greek and Latin texts, including a complete set of the Teubner texts.

(4) A practically exhaustive collection of the published Greek and Latin Inscriptions: *e. g.*, *Corpus Inscriptionum Graecarum*, *Corpus Inscriptionum Latinarum*, *Corpus Inscriptionum Atticarum*, *Inscriptiones Graecæ Antiquissimæ*, *Ancient Greek Inscriptions of the British Museum*, *Loewy's Inschriften Griech. Bildhauer*, *Dittenberger's Sylloge Inscriptionum Graec.*, *Collitz' Sammlung der griech. Dialekt-inschriften*, *Le Bas, Voyage Archéologique*, *Museo Italiano, Inscriptiones Latinæ Antiquissimæ*, *Inscriptiones Neapolitanae*, also the collections of Rangabé, Kumanudes, Larfeld, Hicks, Cauer, Kaibel, Robert, Zuetaiëff, Dessau, Garruccius, Wilmanns, Lattes, etc.

(5) The most essential manuals of reference in ancient history, antiquities, history of literature, grammar, dialects.

MUSEUM.

The Museum of Classical Archæology is composed chiefly of casts representing the history of Greek and Roman sculptural art, and is also supplied with various plaques, models, reconstructions, fac-similes of coins, etc. The nucleus of the collection was purchased with a fund given for the purpose by the Hon. Henry W. Sage.

The museum occupies a room ninety-four feet in length by fifty-two in breadth, which space is greatly expanded, practically, through separation into galleries and alcoves by means of curtains hung between columns. Its interior architecture and decoration have been managed largely in imitation of the antique, mainly in the simpler Greek forms, while the office of the museum has the gay wall decoration of a Pompeian room. The collection itself consists principally of full-size reproductions of the best and most widely known antique sculptures, from the colossal and life-size figures down to the miniature bronze statuettes and terra-cotta figurines. The number of plaster-casts, not including the prints from ancient engraved gems, but including statuary proper, relief sculptures, and statuettes, exceeds five hundred pieces.

THE CORNELL STUDIES IN CLASSICAL PHILOLOGY.

This series of papers and monographs is intended to afford an opportunity for the publication of material which either from the nature of the subject or the extent and completeness of the treatment is better suited to a distinct volume than to the pages of the current journals. It limits itself to work done at Cornell University by teachers or students. It is not a journal, but a series of monographs appearing at

indeterminate intervals. Published by Ginn & Company, Boston, Mass. The following numbers have already appeared :

I. The *cum*-Constructions: their History and Functions. By William Gardner Hale. Part i: Critical ; 74 pp., 1887. Part ii: Constructive ; 189 pp., 1889.

II. Analogy, and the Scope of its Application in Language. By Benjamin Ide Wheeler ; 50 pp., 1887.

III. The Asklepios Cult. By Alice Walton ; 138 pp., 1894.

IV. The Development of the Athenian Constitution. By George Willis Botsford ; 249 pp., 1893.

ADVANCED DEGREES.

MASTER OF ARTS.

The degree of Master of Arts is intended to represent a year of faithful work of an advanced character. It is conferred on those who have taken the corresponding baccalaureate degree here, or at some other college or university where the requirements for that degree are equal to those of this University, on the following conditions :

Candidates must spend at least one year at the University in pursuance of an accepted course of study. They must present a satisfactory thesis and pass a satisfactory examination on the major and minor subjects chosen for the degree.

DOCTOR OF PHILOSOPHY.

The degree of Doctor of Philosophy is conferred on the following conditions :

1. In order to become a candidate, the applicant must have pursued a course of study equal to that required for graduation in this University in the course of Arts or Philosophy.

2. The candidate must spend at least two years at the University pursuing a course of study marked out by the Faculty. In exceptional cases a year of graduate work in a University elsewhere may, by a special vote of the Faculty, be accepted in place of a year's work in this University.

3. The candidate must present a thesis of such a character as shall display power of original and independent investigation, and must pass the requisite final examinations on one major and two minor subjects.

4. Successful candidates for the degree of Doctor must print their theses and deposit twenty-five copies in the Library.

EXPENSES.

The annual tuition fee in the courses in Arts and Philosophy and for graduates is \$100, \$40 to be paid at the beginning of the first term, \$35 at the beginning of the second, and \$25 at the beginning of the third.

The cost of living in Ithaca, including board, room, fuel and lights, varies from \$5 to \$10 per week. By the formation of clubs, students are sometimes able to reduce their expenses to \$4.50 per week for room and board, and occasionally to even less than that amount.

A fair estimate of the yearly expenses is from \$325 to \$600, but much depends upon the personal tastes of the student.

The cost for board, rent of furnished room, fuel, and lights, at the Sage College, which is exclusively for women, varies from \$5 to \$6.50 a week. A student occupying alone one of the best rooms pays \$6.50 a week. If two occupy such a room together the price is \$5.75. Those occupying less desirable rooms, with two in a room, pay \$5 a week each.

FELLOWSHIPS AND SCHOLARSHIPS.

A. For graduates: two fellowships in Greek and Latin, one graduate scholarship in comparative philology and archæology, and one in Greek and Latin. These are awarded by the general faculty of the University upon the recommendation of the departments of Greek and Latin.

These fellowships are intended for college graduates of high character and marked ability or high attainments. The annual income from the fellowships is \$500, and from the scholarships \$300. The tuition fee for the Fellows and Scholars is the same as for others. The term of each is one year, but the holder may be reappointed in exceptional cases.

B. For undergraduates. There will annually be thrown open to competition by all members of the freshman class who are registered in courses leading to degrees, at a special examination held directly after the September entrance examinations, nine scholarships of the annual value of two hundred dollars each.

For details concerning the examinations for these scholarships and for all further information address The Registrar of Cornell University, Ithaca, N. Y.

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INSTRUCTION

IN

Greek, Latin, Comparative Philology

AND

Classical Archæology,

FOR THE ACADEMIC YEAR

1895-1896.

ITHACA, N. Y.
PUBLISHED BY THE UNIVERSITY.

STAFF OF INSTRUCTION

IN GREEK, LATIN, COMPARATIVE PHILOLOGY AND
CLASSICAL ARCHÆOLOGY.

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Comparative Philology.

In Athens as Professor in the American School of Classical Studies
CHARLES EDWIN BENNETT, A.B., Professor of Latin,
1 Grove Place

LOUIS DYER, A.M., Acting Professor of Greek.

GEORGE PRENTICE BRISTOL, A.B., Associate Professor of Greek,
5 Grove Place

ALFRED EMERSON, Ph.D., Associate Professor of Classical Archæ-
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HERBERT CHARLES ELMER, A.B., Ph.D., Assistant Professor of
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72 Huestis Street

ANDREW CURTISS WHITE, Ph.D., Reader in New Testament
Greek, 100 Dryden Road

IN ENGLISH, ROMANCE, AND GERMANIC PHILOLOGY, AND
IN ANCIENT HISTORY.

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Rhetoric and English Philology, *34 Stewart Avenue*
HOWARD PARKER JONES, Ph.D., Instructor in German,
Valentine Place
HANS LUDWIG WENCESLAS OTTO, Instructor in French,
78 Huestis Street

GREEK.

*Office of the department, White 3a. Consultation hours as follows :
Professor Dyer, W., F., 11; Professor Bristol, T., Th., S., 11;
Dr. Forman, T., Th., S., 9; Professor Hammond, M., 12; Professor
Emerson, at Cast Museum, T., W., Th., F., S., 12.*

The courses in Greek may be grouped under four heads: (1) The general and elementary work represented by courses A., 1, 2, and 2a. The course in elementary Greek has been added for the advantage of non-Greek students, who for any reason may have found it desirable, though late in their college course, to acquire a knowledge of the language, and are willing to incur the labor incident to doing two years' work in one. The Freshman work is directed toward training in the accuracies of the language, especially in syntax; the Sophomore work toward impressing upon the student a sense for the literary standards and the ideas peculiar to the Greeks. (2) The advanced work in study of the literature. Beside the course intended especially for Juniors (3 or 4) there are offered within the scope of two years reading-courses in (a) the orators, (b) the elegiac and lyric poets, (c) the tragedians, (d) Aristophanes, (e) Plato, (f) Aristotle, (g) a course surveying the literature in general, (h) a course in the New Testament. (3) History and antiquities. Here belong course 9 in Greek, and the courses in archæology and ancient history offered by the departments of archæology and history; also the course Greek 2a which is largely devoted to the historians. (4) The language, under which head belong courses 13, 14, 15, 16. All students who intend to become specialists in Greek are advised to take, in connection with their reading, the course in ad-

vanced composition, if possible, both in the Junior and Senior year. The courses in historical grammar should, as a rule, be postponed until the Senior year or the graduate years, but Sanskrit may be begun with advantage in Junior year. A year of Sanskrit should precede course 15 (Comp. Philol. 2). Students specializing in Greek are also recommended to take at least one year in Old English. Latin should always be a parallel study with Greek.

A. **Elementary Greek.** The essentials of the grammar. Simple exercises in composition. The reading of selections from the *Anabasis* of Xenophon, and from Plato. M., W., F., 8, *White 13*.
Dr. FORMAN.

This course is designed for students who wish to acquire, by extraordinary effort in one year, the ability to read Attic prose. It cannot be counted for graduation in the course in Arts.

After a term's work in the essential forms of inflection of the nouns and verbs, in connection with Moss' Greek Reader, the class will begin the reading of Xenophon's *Anabasis*, upon which will be based further instruction in the inflexions and a thorough study of all ordinary syntactical constructions. Exercises in Greek composition, based upon the author read, will be assigned daily, and translation at sight will be encouraged from the beginning. In the Spring term the class will be introduced to Plato; rapid reading will be aimed at, and special attention given to the acquirement of vocabulary.

Text books: Moss, *First Greek Reader*, Boston, 1890. (2d ed.); Goodwin, *Greek Grammar*, Boston, 1892, (Revised ed.); Xenophon, *Anabasis I-IV*, with Vocabulary, Goodwin & White, Boston, 1892; *Greek Composition*, Collar and Daniell, Boston, 1893; Plato, *Euthyphro* and *Menexenus*, Graves.

1. **Freshman Course.** Lysias. Homer's *Odyssey*. Plato. T., Th., S., 10, *White 6 and 13*. Associate Professor BRISTOL and Dr. FORMAN. The class will be divided into sections on the basis of scholarship at the beginning of the winter and of the spring terms. See also course 2a.

In the fall term the reading is selections from Lysias. This is accompanied by a careful review of the principles of the normal syntax of Attic prose, and especially the syntax of the verb. Exercises in the writing of Greek are given each week either in connection with the text being read at the time, or from some text book on Greek composition. The translation of Greek at dictation is also practiced, and the writing by the class of sentences read by the instructor is occasionally required in order to help the formation of a correct pronunciation. In the winter term selections from the *Odyssey* are read, and in connection with the work several lectures are given to the class on the lan-

guage and style of Homer, and upon some portion of the antiquities. The work of this term is literary rather than grammatical. In the spring term the reading is in the easier portions of Plato, the passages chosen being descriptive and not argumentative. The composition work of the fall term is again resumed. The text books used are Bristol's Select Orations of Lysias, Boston, 1892; Merry's Odyssey, Books 1-12, Oxford, 1892; Purves' Selections from Plato, Oxford, 1891.

2. **Sophomore Course.** The Philippics of Demosthenes. Sophocles' Antigone. The Acharnians of Aristophanes. Extra reading required; the Characters of Theophrastus, the Iphigenia in Tauris of Euripides, and the Plutus of Aristophanes. Greek composition for two terms. Outline lectures upon the history of Greek literature. M., W., F., 9, *White 6*. Dr. FORMAN.

This course, which ends the required work in Greek, is arranged with some reference to students whose college study of Greek may cease at this point. The central aim is to impress upon the student a sense for Greek literary standards, and to afford him some opportunity of appreciating the ideas and conceptions of life peculiar to the Greeks as revealed in the masterpieces of their literature. Each term a work is assigned for reading outside the class, and an examination is held upon it. No particular text books are required, but the following are most commonly used: Tarbell's Philippics of Demosthenes, Boston, 1886; D'Ooge's Antigone of Sophocles, Boston, 1886; Flagg's Iphigenia in Tauris of Euripides, Boston, 1889; Merry's Acharnians of Aristophanes, New York, 1887; Green's Plutus of Aristophanes, Cambridge, 1881.

2a. **Supplementary Courses**; open to Sophomores and to Freshmen who receive the special permission of the instructor. Hellenica of Xenophon, Selections from Books V—VII. Herodotus, Books VI and VII. Selections from Lucian. W., F., 10, *White 13*. Dr. FORMAN.

This course may be taken for any one or more terms.

This course is intended for those Sophomores and more advanced Freshmen, who desire to devote to the reading of Greek more time than the number of hours required for the A.B. degree. It should especially be elected by all who purpose to pursue the study of the language in the later years of their course. It affords an opportunity, not otherwise given, to gain an acquaintance with the writings of Herodotus and Lucian, and with portions of Xenophon not frequently read. The aim will be to supplement the more thorough drill of the required courses, and to cultivate ease in translation by the reading of a large amount of each author, and practice in rendering at sight.

Text books : Xenophon, *Hellenica* V—VII, Bennett, Boston, 1892 ; Herodotus, Books VI and VII, Merriam, New York, 1885 ; Selections from Lucian, Williams, Boston, 1892.

3. **Junior Course.** Thucydides, Portions of Books I and II. Demosthenes on the Crown. Aeschylus' Prometheus Bound. M., W., F., 10, *White* 6. Associate Professor BRISTOL.

This course is intended to furnish a third-year reading course for (a) those students who do not intend to specialize in Greek but wish to secure a greater familiarity with the literature than has been gained from courses 1 and 2, and (b) to students wishing to take further special work in the literature, or the language. In these courses the attention will be concentrated mainly upon the style and subject matter of the works read. The books used are, for Thucydides, Book I by Morris, Boston, 1887, Book II by Marchant, London, 1891. Aeschylus' Prometheus by Wecklein, translated by Allen, Boston, 1891. Demosthenes on the Crown by Drake, London, 1889.

5. **Oratory.** Selected orations of Andocides, Lysias, Isaeus, and Demosthenes. Lectures on the development of Attic oratory, and on Athenian legal antiquities. W., F., 9, *White* 3. Associate Professor BRISTOL.

Not given in 1895-96.

This course is open to those who have passed in courses 1 and 2, and in 3 or 2 a. The aim is to give a view of the development of Athenian legal oratory on its literary and practical sides, and to study the judicial and legal systems of Athens. Besides the reading of large portions of the works mentioned above, typical extracts are read from Antiphon and Aeschines. The careful study of Blass' and Jebb's works on the Attic orators, and of Meier and Schömann's *Der attische Process* is recommended. The texts used are those in the Teubner series, and students are advised to have these interleaved when bound. Also Andocides, Marchant, London, 1889. Demosthenes, *Select Private Orations of Demosthenes* by Paley and Sandys, Cambridge, 1886.

6. **Elegiac and Lyric Poetry.** Anthologia Lyrica (Hiller). Pindar, selected odes. Lectures and recitations. W., F., 9, *White* 3. Associate Professor A. EMERSON.

The reading of the principal fragments of the elegiac, iambic, and melic poets. The course has primarily a literary and not a linguistic aim. In connection with it lectures are given on the early forms of Greek verse and of Greek music and on their application and growth. The text followed is for the purposes of convenience Hiller's in the Teubner series, and the use of Farnell's *Greek Lyric Poetry* is advised. In reading Pindar, Gildersleeve's edition is used, New York, 1885.

7. **The Tragedy.** Aeschylus' *Oresteian trilogy*. Sophocles' *Oedipus Tyrannus*. Euripides' *Hippolytus*. M., W., F., 10, *White* 3. Acting Professor DYER.

The careful study of some of the masterpieces of Greek tragedy, together with discussion of the literary history and the scenic antiquities. This may be followed by the reading of the *Poetics* of Aristotle as an introduction to criticism. Courses 6 and 7 are intended for students who have considerable facility in reading Greek. They may be taken by graduates and by undergraduates who have taken courses 1 and 2, and 3 or 5. The books followed are Wecklein's *Oresteia* of Aeschylus, Leipsic, 1888, and *Hippolytus* of Euripides, Leipsic, 1885; Jebb's *Oedipus* of Sophocles, Cambridge, 1890.

8. **Aristophanes.** The *Knights*, *Clouds*, *Wasps*, *Peace*, *Birds*, *Frogs*. Lectures on the development of Greek comedy and its scenic representation. T., Th., 8, *White* 3. Dr. FORMAN.

This course will not be given in 1895-96.

A careful study is made of six plays, two being completed each term. Of the remaining five, the three not read in course 2 are presented to the class with brief comments on the plots, objects of satire, and others matters of interest. Lectures are given on the origin and history of comedy, and its mode of presentation.

No Greek author illustrates so richly as Aristophanes the public and private life of the Athenian people, their social customs, morals, religion, and education. These topics therefore will be dwelt upon, and it is expected that each member of the class will personally investigate some point in this connection, or a question of language or metre, according to preference.

Text books: *Knights*, *Clouds*, *Wasps*, *Birds*, and *Frogs*, Merry, Oxford, 1887, '89 (new ed.), '93, '89, and '87; *Peace*, Green, London, '73; Rogers, London, '67; Ritter, *Wolken*, Vögel, Frösche, Kock, Berlin, 1882 (3rd ed.), '94 (4th ed.), '94 (3rd ed.), '81 (3rd ed.); *Comoediae*, Blaydes, Halle, 1880-93; *Scholia*, Dübner, Paris, 1883; Dunbar's *Concordance*, Oxford, 1883; Couat, *Aristophane et l'ancienne Comédie Attique*, Paris, 1889; Haigh, *The Attic Theatre*, Oxford, 1889.

9. **The Private and Political Antiquities of the Greeks.** The first two terms will be devoted to a study of the private life of the Greeks, with illustrations (by lantern views, photographs, etc.) from ancient monuments and remains. The third term will be given to a review of the political institutions of Athens and Sparta. T., Th., 11, *White* 6. Professor WHEELER.

This course will not be given in 1895-96.

This course includes lectures on the following topics: The physical geography of Greece. Characteristics of the Greek people. The pop-

ulation of Greece. The modern state and people of Greece. Attica. Athens. The Acropolis. Life of the Greek women. Marriage and the wedding. The children. The slaves. The house. Furniture. Clothing. Dress for head and feet. Toilet and the bath. Food and drink. Table usages. Cost of living. Round of daily life. Sickness and physicians. Death and burial. Society and social entertainment. Religion. Ritual and worship. Theory of education. Schools and teachers. Athletics. Music. Theatre. Dramatic representations. Agriculture and stock. Merchants and trade. Weights and measures. Money. Arts and industries. Travel, roads, inns and conveyance. Army, armor and tactics. Ships. Ancient vs. modern conception of the state. Development of the institutions of the state. Various forms of government. The Spartan state; classes of the people and departments of government. Spartan discipline of life and the policy of the state. Development of the Athenian state. The Athenian democracy. The office-holders. The Athenian town-meeting. The courts. The finances. The state socialism of the fourth century. Relation of states to each other.

The following books are very useful in connection with the course and students are advised to own at least one of them: Smith's Dictionary of Antiquities, 3rd ed., Boston, 1890; Baumeister's Denkmäler aus dem classischen Altertum, Munich, 1888; Göll's edition of Becker's Charicles, 3 vols., Berlin, 1885; Hermann-Blümner, Lehrbuch der griechischen Privatalterthümer, Freiberg, 1882; Müller, I, Die griechischen Privataltertümer in vol. IV of Müller's Handbuch der Altertumswissenschaft, Nördlingen, 1887; Guhl and Koner, Life of the Greeks and Romans, 1883; Blümner, H., The Home Life of the Ancient Greeks, New York, 1893. For the lectures of the third term: Gilbert, G., Handbuch der griechischen Staatsalterthümer, 2d ed., Leipzig, 1893; Schöman, The State (Antiquities of Greece), London, 1880; Busolt, G., Die griechischen Staatsaltertümer, in vol. IV of Müller's Handbuch der Altertumswissenschaft, Nördlingen, 1887.

10. The Dialogues of Plato: the Republic and Theætetus in the Original Text. M., W., F., 10. Assistant Professor HAMMOND.

This course is intended for students of Greek Literature as well as of Greek Philosophy. The dialogues above named will be read rapidly through, attention being directed both to matter and form. Members of the class will be required to prepare, from time to time, essays on themes connected with the work in hand. The Teubner text is recommended, and Pater's Plato and Platonism (published by Macmillan & Co., New York) will be used as a commentary.

11. Studies in Greek Literature and Religion. The course will deal with subjects similar in their nature to the following, which are

given as representative topics : The newly discovered pictographs from Crete and the Peloponnese.—The Mycenaean civilization.—The authorship of the Iliad and the Odyssey.—Homeric ideals and primitive cults.—The view of nature revealed in Greek poetry, early and late.—Romanticism and classicism.—Types of excellence as presented in Homeric heroes.—The government of Zeus and that of the heroic kings.—The gods of Homer taken individually.—The Homeric Underworld.—Pindar's conception of the gods and of man's immortality.—Pindar's heroes and heroines.—Studies of the gods and men represented by Aeschylus, Sophocles, and Euripides.—The worship of Dionysus, more especially in Attica.—Athens and the Athenian Acropolis.—Aphrodite and the island of Cyprus.—Demeter and Persephone at Eleusis.—Apollo at Delphi and Delos.—Plato and the poets.—Greek religion and the Platonic philosophy.—The worship of Aesculapius, of Hermes, of Artemis. T., Th., 10, *White 3*. Acting Professor DYER.

Books will be recommended for reading, such as Pater's *Greek Studies* and Plato and Platonism, Butcher's *Some Aspects of the Greek Genius*, and illustrative selections from Greek authors will be dwelt upon in the different lectures.

12. Advanced Greek Composition. Weekly practice in the writing of more difficult Greek. *White 3*. Dr. FORMAN.

In this course the students are under the direct personal supervision of the instructor. Translations are prepared weekly, and the work of each member is criticised privately at an hour arranged. The passages assigned are selected with a view to the special needs of the individual members of the class. The attention of the student is directed to the proper rendering of English idioms into Greek, and the correct choice of words ; while the more advanced are given passages from English authors for translation in the style of Greek writers of narrative, rhetorical, or philosophical prose.

As a basis for work, Sidgwick, *Introduction to Greek Prose Composition*, Boston, 1885, will be used.

13. New Testament Greek. Fall Term : Gospel of Luke. Introduction to New Testament philology. Interpretation of the Greek text. Winter term : The Acts of the Apostles and selections from the Epistles illustrating the life of St. Paul. Interpretation of the Greek text. Study of New Testament words and syntax. Spring term : Selections from early Christian Greek writers. Interpretation of the Greek text. Historical and biographical papers by the instructor and members of the class. This course is open to those who have passed in course 1. *Barnes Hall, Library Room*. W., F., 8. Dr. A. C. WHITE.
Each member of the class should be provided with a complete text

of the New Testament. Recommended is : The New Testament in the original Greek, edition for schools. Edit. Westcott and Hort. 18mo. Cloth, \$1.00 (or the edition with Hickie's Lexicon. Leather, \$1.90). Each member should also have : Gwatkin, H. M., Selections from Early Writers, illustrative of church history to the time of Constantine. \$1.25. Recommended are also : Cambridge Greek Testament : Luke, ed. by Farrar, \$1.50 ; Acts, ed. by Lumby, \$1.50 ; Thayer, J. H., Greek-English Lexicon of the New Testament. Cloth, \$5.00.

15. **Modern Greek.** Introduction to the Grammar. Reading. Lectures on Modern Greek literature. Fall term. W., F., 10, *White 3a*. Associate Professor ALFRED EMERSON.

16. **Philological Seminary.** The Greek dialects studied from the inscriptions. Special problems of Greek grammar. Preparation and discussion of papers by members of the seminary. W., 3-5, and an additional hour at the pleasure of the instructor. Associate Professor BRISTOL.

The work of the seminary for any given year is made to centre about some author or other source of knowledge of the language. In 1895-96 the subject will be Homer. Members of the seminary are all required to have some special subject for investigation, usually connected with the general subject occupying the seminary for the year. Reports upon the progress of their work are made every four weeks, and a thesis or a written summary embodying the results of the year's work is required at the close of the year. Application for admission to the seminary must be made in advance.

GREEK PHILOSOPHY.

History of Ancient and Mediæval Philosophy. Lectures and textbook. T., Th., 10. Assistant Professor HAMMOND.

This course, given in 1894-95, will be repeated in 1896-97.

The Politics of Aristotle, with an introductory survey of political theories amongst Aristotle's contemporaries. Lectures and prescribed reading. S., 10. Assistant Professor HAMMOND. Philosophy, 9.

The introductory lectures of this course will be devoted to a general review of the leading political theories amongst the Greeks, and more particularly to the ethical import of Politics in the philosophies of Plato and Aristotle. The treatise of Aristotle on Politics in an English translation will be read by the class and made the subject of detailed and critical study. Welldon's translation is recommended. (Macmillan & Co., New York).

Seminary in Ancient and Mediæval Philosophy. Two hours a week. Assistant Professor HAMMOND. Philosophy, 36.

(a) *Graduate Section.*—Aristotle's *De Anima* will be made the basis of work. Members of the Seminary will, however, be expected to acquaint themselves during the year with other parts of Aristotle's system in translations and expositions. Special themes growing out of the Psychology will be selected by, or assigned to, members of the Seminary, and informal reports thereon will be made from time to time during the year. The results of these reports and discussions of matter and method will, before the end of the year, be set forth in a formal paper representing the student's research on the special topic. The *De Anima* will be read in Biehl's edition (published by Teubner). Wallace's edition of the Psychology (Macmillan & Co., New York) is also recommended to the use of members of the Seminary.

(b) *Undergraduate Section.*—Students who are writing theses for their bachelor's degree on subjects in Ancient or Mediæval Philosophy, meet in this section for the reading and discussion of materials and for the criticism of method.

LATIN.

The aim of the work in Latin is, in general, to give the student a wide and accurate knowledge of the essential features of Roman thought and character as revealed in the literature and the monumental remains. To this end the best literary masterpieces, Cicero, Livy, Horace, Terence, and Tacitus, are made the basis of the required work of the freshman and sophomore years. While, however, the main aim is literary, constant attention is paid to the language, and the writing of Latin is made a regular exercise during the freshman and sophomore years.

To those who elect Latin in the junior and senior years ample opportunity is afforded for wider reading. Courses are offered in Plautus, Terence, Lucretius, Catullus, Pliny (the Letters), Juvenal, Tacitus; also in Cicero's Letters, *De Oratore*, *De Officiis*, and *Tusculan Disputations*. The history of Roman literature receives detailed treatment in a course of lectures running through the spring term, in alternate years.

To afford a more thorough and sympathetic knowledge of Roman life than the courses in literature alone would offer, a systematic course of lectures on private antiquities is given in alternate years. These lectures are abundantly illustrated, mainly by lantern views and photographs prepared from the remains of Roman civilization preserved in Pompeii, Herculaneum, Rome, and elsewhere.

To students whose interest extends to the scientific aspects of the

language (and especially to those who are preparing to be teachers) ample provision is made by the Teacher's Training Course and by the exercises of the Latin Seminary. In the Latin Seminary attention is devoted to the language on its syntactical side. For the formal side provision is made by a course in the Italic dialects (Latin, Oscan, Umbrian).

Special courses in Latin writing for advanced students, in sight reading, and in palaeography, are also offered.

1. **Livy. The De Senectute of Cicero. Horace. Selections from the Odes. Latin Writing.** In four sections. M., W., F., 9, *Morrill 3*. Professor BENNETT. M., W., F., 10, *Morrill 6*. Acting Assistant Professor JOHNSTON. M., W., F., 9, *White 10*. Mr. EDMISTON. M., W., F., 11, *White 10*. Mr. EDMISTON.

Without neglecting necessary attention to the language, chief stress is laid upon a sympathetic literary interpretation of the works read. To this end the practice of translation into the best English is carefully cultivated. Weekly exercises in Latin writing accompany the course.

Text books : Westcott's or Greenough's *Livy* ; Reid's *de Senectute* ; Shorey's or Smith's *Odes of Horace*.

2. **The Phormio of Terence. Horace : Selections from the Epodes, Satires and Epistles. Translation at sight. Tacitus' Dialogus de Oratoribus.** Collateral reading upon the history of Rome during the period covered by the life of Horace. Latin writing. Wilkins' *Primer of Roman Literature*. In three sections ; two T., Th., S., 9 ; one T., Th., S., 10, *Morrill 6 and 12*. Acting Assistant Professor JOHNSTON and Mr. EDMISTON.

Open to students who have completed course 1.

During the first term the *Phormio* of Terence is read, somewhat critically, and the *Adelphoe*, or some other play of Terence is translated at sight. The second term and part of the third are devoted to selections from the *Epodes*, *Satires* and *Epistles* of Horace. The remainder of the year is devoted to the *Dialogus de Oratoribus* of Tacitus, with reference to its subject matter, its stylistic features and its general historical interest. An exercise in the writing of Latin is held once a week throughout the first two terms of the year.

Text books : *Phormio*, Sloman ; *Horace* : *Epodes*, Smith ; *Satires and Epistles*, Greenough, Kirkland, or Wickham, (Chase's *Horace* may be used as a convenient edition of the entire works of Horace) ; *Dialogus*, Bennett ; *Latin Writing*, Preble and Parker ; *Roman Literature*, Wilkins, and the larger works of Teuffel and Sellar.

3. **Selections from Cicero's Letters. Cicero De Oratore.** Assistant Professor ELMER. W., F., 11, *Morrill 12*.

Course 3 will not be given in 1895-96.

The course is open to students who have completed course 1, and is especially recommended to those who may be planning to elect Latin later. It alternates with course 4.

While the letters of political interest are not neglected, special attention is given to the study of the character of Cicero as a private man in his family and among his friends. The *De Oratore* is studied chiefly with reference to its subject matter, and is intended as a general introduction to the rhetorical productions of Cicero.

Text books: Cicero's Letters, Muirhead and the smaller work (Cicero in his Letters) of Tyrrell; *De Oratore*, Wilkins.

4. **Selections from Cicero's De Officiis and the Tusculan Disputations.** Acting Assistant Professor JOHNSTON. W., F., 11, *Morrill 12*.

This course is open to students who have completed course 1, and is especially recommended to those who may be planning to elect Latin later. It alternates with course 3.

Text books: Holden's Edition of the *De Officiis*; Tischer and Sorof's *Tusculan Disputations*.

5. **Selections from the Republican Literature; Plautus, Lucretius, Catullus. Lectures on the History of Roman Literature.** T., Th., S., 9. Professor BENNETT.

Course 5 will not be given in 1895-96.

The *Captivi* of Plautus is read first and is followed by the *Mostellaria*. Special attention is paid to the diction and metres. Large portions of the Latin text of the *Captivi* are read aloud from day to day, and when the play is finished it is translated rapidly in two consecutive sessions. Lectures are given on the origin and literary history of Roman comedy, including the mode of scenic presentation.

Lucretius is read both as a poet and a philosopher. With this is combined a study of Epicureanism from other sources, along with some notice of contrasting philosophical systems. Catullus, while receiving briefer attention than Plautus or Lucretius, is read in representative lyric, heroic, and elegiac poems.

The spring term is devoted to a systematic course of lectures on the origin and development of Roman literature, and its history down to the close of the Augustan Age.

Text books: Hallidie's or Lindsay's *Captivi* of Plautus; Sonnenschein's *Mostellaria*; Kelsey's *Lucretius*; Merrill's *Catullus*.

6. **The Literature and History of the Early Empire: Pliny the Younger, Juvenal, and Tacitus.** History of Roman Literature; Capes' Early Empire. T., Th., S., 9, *Morrill* 3. Professor BENNETT.

Pliny's Letters, especially those bearing upon the contemporary literary life of Rome, are read in the fall term. The winter term is devoted to Juvenal. In connection with this author Cape's Early Empire is read, and considered in weekly discussions. The class are also encouraged to pursue collateral reading in the larger histories, as Merivale's. The spring term is devoted to a reading of the early books of Tacitus' Annals, with reference not only to the subject matter but to the peculiarities of language and style characteristic of this author.

Text books: Prichard and Bernard's Pliny; Hardy's Juvenal; Allen's Tacitus.

7. **Advanced Course in Latin Writing.** Open to students who have completed course 2, and, by special permission, to others. S., 11, *Morrill* 12. Acting Assistant Professor JOHNSTON.

The aim of this course is to inculcate some appreciation of Latin style and to give the student as much facility as possible in thinking in Latin without reference to the English. Original orations and essays are written by the students, and read and discussed before the class. Students thus get considerable training in understanding Latin at hearing. In connection with this work parts of Cicero's orations are studied with special reference to their stylistic features.

8. **Teacher's Training Course:**

Course 8 will not be given in 1895-96.

(a) Study of the evidences for the pronunciation of Latin. Hidden quantities. Peculiarities of orthography. Original force and historical development of the cases. The subjunctive, with special reference to its primitive meaning and the history of its development in subordinate clauses. F., 12.

(b) Practical exercises in the study of the Grammar, Caesar, Nepos, Cicero, and Vergil. W., 12.

Of this course, (a) may be taken without (b), but (b) may not be taken without (a). The general aim of the course is to prepare students who intend to teach to enter upon their first year of work with confidence. Professor BENNETT.

9. **The Private Life of the Romans.** A systematic consideration of the constitution of the Roman family, status of women, marriage, children, education, slavery, the Roman house and its furniture, food, dress, baths, games and amusements, books,

trade, travel, religion, death, burial, etc. Lectures, copiously illustrated by lantern views, photographs, and material in the Museum of Casts. W., F., 12, *Morrill* 3. Fall and Winter Terms. Professor BENNETT.

Open to students of the sophomore, junior, and senior years.

10a. **Latin Seminary.** Study of special chapters in the syntax of the Latin cases. Preparation of papers by members of the seminary. Occasional sessions of the seminary will be devoted to the consideration of current periodical literature in the field of Latin. T., 3-5. Professor BENNETT. Omitted in 1895-96.

10b. **Latin Seminary.** Study of special problems in the syntax of the moods, particularly the Subjunctive. Preparation of papers by members of the seminary. T., 3-5. Professor BENNETT. A third hour will occasionally be devoted to the consideration of periodical literature in the field of Latin.

The object of the seminary is to familiarize its members with the methods and habits of independent investigation; the work therefore, so far as possible, is thrown into the hands of the students themselves. The seminary is open to graduates, and by special permission to undergraduates of superior attainments. Students intending to take these courses should confer with the instructor before Commencement, that the necessary books may be ordered from abroad in due season. 10a and 10b are given in alternate years.

11. **Study of the Italic Dialects** (Latin, Oscan, Umbrian) in inscriptions, with special reference to the sounds, inflexions, and word-formation of the Latin language. Discussion of disputed Latin etymologies. Professor BENNETT. Th., S., 10, *Morrill* 3.

Text books: Schneider, *Dialectorum Italicarum Exempla Selecta*, Leipsic, 1886; Buck, *Vokalismus der Oskischen Sprache*, Leipsic, 1893; Zuettaieff, *Inscriptiones Italiae Inferioris Dialecticae*, Moscow, 1886; Buecheler, *Umbrica*, Bonn, 1883.

12. **Reading of easy Latin at sight.** Selections from Nepos, Gellius, and Ovid. This course is intended especially for freshmen. S., 8, *Morrill* 3. Mr. EDMISTON.

This course is intended to assist underclassmen in learning to read with some facility Latin prose and verse of average difficulty. In the first term, the class reads selected stories from Aulus Gellius, who furnishes interesting subject matter, and whose style, on account of his studied imitation of earlier writers, makes a nearer approach to classical standards than that of some of his contemporaries. The more important biographies of Cornelius Nepos

are read in the second term, and selections from Ovid, especially from the *Metamorphoses*, in the third.

- II. **Lectures on the History and Scope of Latin Study.** The object of this course is to acquaint the student in a general way with the different fields of Latin study, the present state of knowledge in each, and some of the more important problems still awaiting solution. The series is open to all, and is recommended to students of the lower classes as well as to those more advanced. One hour. M., II, *Morill* 3. Not given in 1895-96.

The following subjects will be treated :

History of Latin Studies since the Renaissance, three lectures.
Professor BENNETT.

The Latin Language, two lectures. Professor WHEELER.

Latin Literature, three lectures. Assistant Professor ELMER.

Roman History, three lectures. Professor BURR.

Roman Philosophy, three lectures. Assistant Professor HAMMOND.

Roman Law, three lectures. Assistant Professor WILLCOX.

Roman Religion, two lectures. Professor C. M. TYLER.

Roman Architecture, Sculpture, Coinage, etc., three lectures. Assistant Professor EMERSON.

Roman Military and Naval Antiquities, two lectures. Mr. EDMISTON.

Roman Epigraphy, one lecture. Professor BENNETT.

Roman Palæography, one lecture. Professor BURR.

Roman Lexicography, one lecture. Professor BENNETT.

15. **Latin Palæography.** An actual study of Mediæval manuscripts and fac-similes in the possession of the University. Winter. W., 4-6. Professor BURR.

For Latin Grammar with reference to the history of sounds and inflections, see under Comparative Philology, Course 9.

For Roman Art, Roman Topography, etc., see under Classical Archæology, Course 2.

For Roman History, see under Ancient History.

ANCIENT HISTORY.

- I. **Ancient Greece and Rome.** Lectures and examinations. Fall term, Greece. Winter and Spring terms, Rome. T., Th., 9. Professor BURR.

An elementary survey of the history of the Greco-Roman world, intended as an introduction for those having no knowledge of the subject and as a thorough review for those already familiar with it. A text-book is used, and examinations upon the knowledge thus gained

alternate with the lectures. The aim of the latter is to give the student a broader view of the topic, and at the same time to direct his attention to the sources of our knowledge. The course is a required one for students in the classical courses; it may be elected by others. The class may be entered at the beginning of the Winter term, but not later.

7. **An Introduction to the Study of History.** *a.* History: its scope, its materials, its methods. *b.* The sciences auxiliary to history. *c.* Historical geography. S., 12. Professor BURR.

The lectures of the first term deal especially with historical method, and are enforced by practical exercises in its use. Those of the second point out the use to history of the leading auxiliary sciences—Anthropology, Ethnology, Archæology, Philology, Palæography, Diplomatics, Sphragistics, Numismatics, Heraldry, Genealogy, Chronology, Geography—discussing the methods, aims, and literature of each. Those of the third term treat more fully the last-named of these sciences in its relations to History. This course alternates with the following, and will next be given in 1895-96.

8. **The Beginnings of History.** *a.* The dawn of history. *b.* Oriental history: to the advent of the Aryan peoples. *c.* Oriental history: to the conquests of Alexander. S., 12. Professor BURR.

A rapid survey of the sources and state of our knowledge of the civilizations prior to those of Greece and Rome. This course alternates with the preceding, and will next be given in 1896-97.

COMPARATIVE PHILOLOGY.

The work in the department of comparative philology is arranged with a view primarily of serving the needs of those who intend to be teachers of language. In coöperation with the linguistic work of the departments of Greek, Latin, English Philology, Germanic and Romance Languages, it seeks to illustrate the modern historical treatment of the languages included in the field of these departments, as well as of the Indo-European languages as a whole, and also to furnish a background for the understanding of linguistic phenomena in general by discussion of the principles involved in the life and growth of language. It looks also toward the training of specialists in the work of philological research through the work of the seminaries as well as that connected with the more advanced special courses. An opportunity is afforded each year for beginning the study of Sanskrit, and advanced work in this and other fields is arranged, independently of the courses announced, so as to meet the needs of particular students.

1. General Introduction to the Science of Language. The chief principles of the life and growth of language; outlines of the science of phonetics; history of the science of comparative philology; historical and ethnological results of the science; classification of languages; salient characteristics of the various branches of the Indo-European family of languages; methods of investigation. M., 12. *White 6.* Professor WHEELER.

This course will not be given again until 1897-98.

This course is intended to serve as an introduction to the scientific study of language. It undertakes no systematic treatment of the material of historical grammar, such as phonology, stem-formation, derivation, composition, inflexion, and syntax, but rather concerns itself with the general principles involved, with the history of methods, the survey of the field of work, and reference to the tools and sources of research. It is intended for students in every line of linguistic study as well as secondarily for students of psychology and the history of thought. The principles discussed are illustrated, so far as possible, from the history of the English language and from the phenomena of the living language.

Constant reference will be made to the following hand books: Paul, H., *Principles of the History of Language*, New York, 1889; Strong-Logeman-Wheeler, *Introduction to the Study of the History of Language*, London, 1891; Wheeler, B. I., *Analogy and the Scope of its Application in Language*, Ithaca, 1887; Sweet, H., *Primer of Spoken English*, Oxford, 1890; Delbrück, B., *Introduction to the Study of Language*, Leipsic, 1882; Vietor, W., *Elemente der Phonetik*, Heilbronn, 1887; Sweet, H., *New English Grammar*, Oxford, 1892; von der Gabelentz, G., *Die Sprachwissenschaft*, Leipsic, 1891. The reading of the following is also recommended: Whitney, W. D., *Life and Growth of Language*, New York, 1891; *Language and the Study of Language*, New York, 1880; Sayce, A. H., *The Principles of Comparative Philology*, 4th edit., New York, 1893; Schrader, O., *Prehistoric Antiquities of the Aryan Peoples*, London, 1890.

2. Comparative Grammar of the Greek and Latin Languages.

Historical treatment of the sounds and inflexions of the Greek and Latin in their relation to the other Indo-European languages. T., Th., S., 11, *White 6.* Professor WHEELER.

Not given in 1895-96, but may be expected in 1896-97.

The introductory lectures of this course review the characteristics of the various Indo-European languages. Then follows a systematic treatment of Indo-European phonology, with special reference to the Greek, Latin, and Teutonic languages, and in the third term a discussion of stem-formation, composition, and inflexion. Syntax is treated

only incidentally. The most important books of reference are : Brugmann, K., *Comparative Grammar of the Indo-Germanic Languages*, New York, 1888-91; Brugmann, K., *Griechische Grammatik*, and Stolz, F., *Lateinische Grammatik*, in vol. ii of Müller's *Handb. der Altertumswissenschaft*, 2d edit., Nördlingen, 1889; Meyer, G., *Griechische Grammatik*, 2d edit., Leipzig, 1886; Schweizer-Sidler, H., *Grammatik der latein. Sprache*, Halle, 1888; King and Cookson, *Sound and Inflexion as illustrated in the Greek and Latin Languages*, Oxford, 1888; Henry, V., *Comparative Grammar of Greek and Latin*, New York, 1890. For reference on the side of Teutonic grammar are especially recommended: Wilmannus, W., *Deutsche Grammatik*, Strassburg, 1893-94; Mayhew, A. L., *Synopsis of Old English Phonology*, Oxford, 1891; Kluge, F., *Etymologisches Wörterbuch der deutschen Sprache*, 5th edition, Strassburg, 1894; Kluge, F., *Vorgeschichte der altgerm. Dialekte*, Paul's *Grundriss I*, 300 ff.

3. **Elementary Sanskrit.** The first twenty-five lessons of Perry's *Sanskrit Primer*; the essentials of the grammar, given in the form of lectures; reading of selections from Lanman's *Reader*. The writing of simple exercises in Sanskrit. T., Th., 11, *White* 3. Associate Professor BRISTOL.

4. **Advanced Sanskrit.** Reading of selections from the *Rig-Veda*. Grammatical discussions. Lectures upon the private and religious antiquities of the ancient Hindoos. Fall term. W., F., 11, *White* 6. Professor WHEELER.

Not given in 1895-96.

A portion of the hymns contained in Lanman's *Reader* will be read, and later, if the course be continued beyond the first term, Aufrecht's editions of the *Rig-Veda* will be used, and selections made from a larger range. The time of the course is fairly divided between grammatical work, interpretation, and a study of the religion and life. Books of reference: Grassman, H., *Wörterbuch zum Rig-Veda*, Leipzig, 1873; Whitney, W. D., *Sanskrit Grammar*, 2d edit., 1887; Zimmer, H., *Altindisches Leben*, Berlin, 1879; Lassen, C., *Indische Alterthumskunde*, new ed., 1894; Kaegi, A., *The Rig-Veda*, Boston, 1886; Barth, A., *The Religions of India*, London, 1882.

5. **Gothic Grammar.** Lectures on the relation of the Teutonic languages to the Indo-European parent-speech. Winter and Spring terms. W., F., 11, *White* 6. Professor WHEELER. See also English course 7a, which should precede this, if possible.

Not given in 1895-96.

Gothic grammar is treated in this course as a branch of Indo-European grammar, and a knowledge of the language is assumed

from the beginning. The phonology and the inflexions are treated systematically, with a view to connecting our own group of languages, especially English, with the history of the other Indo-European branches. Books used in connection with the course: Braune, W., Gothic Grammar, London, 1883; Balg, G. H., Comparative Glossary of the Gothic Language, Mayville, 1887-89; Wright, J., Primer of the Gothic Language, Oxford, 1892; Bernhardt, E., Vulfila, Halle, 1875; Brugmann, K., Comparative Grammar of the Indo-Germanic Languages.

6. **Balto-Slavic Grammar.** Study of Old Bulgarian from Leskien's Handbuch der altpulgarischen Sprache. Spring term. T., Th., 12. Professor WHEELER.

Not given in 1895-96.

This course affords an introduction to Balto-Slavic grammar. The sounds and inflexions of Old Bulgarian are studied in close comparison with the Lithuanian, and are explained in terms of Indo-European grammar. Leskien, A., Handbuch der altpulgarischen Sprache, 2d ed., Weimar, 1886; Miklosich, F., Etymologisches Wörterbuch der slavischen Sprachen, Vienna, 1886; Kurschat, F., Grammatik der litauischen Sprache, Halle, 1876.

7. **Philological Seminary.** The Greek dialects studied from the inscriptions. The Iliad of Homer. Special problems of Greek historical grammar. Preparation and discussion of papers by members of the seminary. W., 3-5, and an additional hour at the pleasure of the instructor. See for description of this course under Greek 16.

ENGLISH PHILOLOGY.

6. **Old English.** An elementary course, with Bright's Anglo-Saxon Reader as a handbook. Intended for those who wish to begin the historical study of English. T., Th., 11, *White 1 B.* Assistant Professor O. F. EMERSON.

7. **English Philology.** Formation of the English Language. M., W., F., 9, *Morrill 22.* Professor HART.

a. Fall term. The Gothic Language; Wright, Primer of Gothic.

b. Winter and Spring terms. Sievers, Old English Grammar; MacLean, Old and Middle English Reader.

Course *a* is introductory and is planned with regard also to students in Comparative Philology, in Old and Middle High German and in Old Saxon. Such students are not required to pursue course *b*.

The aim of the course is to lay the foundation for the systematic study of English philology. In the fall term the students investigate the forms of the Gothic language, and the general features of *Ablaut*,

as they occur in the verb-system of Teutonic speech. Also the most general features of consonant-shifting from Indo-European to Teutonic. In the winter and spring terms they investigate the specific English vowel and consonant systems, the conjugation and declension, and the metrical system according to Sievers. The amount of text read is not large, but is enough to illustrate the grammatical and metrical peculiarities of the language.

8. **Advanced English Philology.** For students who have taken course 7. Reading of longer Early or Middle English texts, with investigation of dialectal peculiarities. Hours and work to be arranged with each student. *Morrill 22.* Professor HART.

Students in this course review the grammar, noting dialectal peculiarities in the texts read, and accumulating material for graduation theses. Thus far the texts critically examined have been the *Beowulf* (twice), the *Elene* and *Andrew*, the *English Bede* (Miller's edition), and Sweet's *Oldest English Texts*.

8. *a.* **Seminary in English Philology.** Preparation of graduation theses. Hours to be arranged with each student. *Morrill 22.* Professor HART.

9. **Middle English Philology.** For students who have taken course 7 or its equivalent. Further development of the language, readings from Middle English texts, and lectures on Middle English grammar. M., W., F., II, *English Seminary*. Assistant Professor O. F. EMERSON.

Special attention is given in this course to the study of the Midland dialect of England, the immediate predecessor of Modern English. Selections, however, from the Northern and Southern dialects are also used to illustrate the more prominent dialectal peculiarities. During the spring term the readings are mainly in the literature of the fourteenth century, particularly of authors other than Chaucer. In order to secure a large number of selections the text books of the fall and winter terms are *Specimens of Early English*, Parts i and ii, by Morris and Skeat, Oxford, 1887, 1889.

Courses 7, 8, and 9 comprise a systematic treatment of the history of the language from the beginning down to and including Chaucer, and are planned with regard to the needs of those who wish to teach English grammar scientifically. Undergraduates are earnestly advised to begin the study in their junior year. Application for admission should be made to the head of the department before the summer vacation.

10. **History of the English Language.** The development of the language down to the present day, with an outline of its changes in sounds, forms, and syntax. Designed for teachers and for

those not making a special study of philology. Recitations based on EMERSON'S History of the English Language, with supplementary lectures especially on English syntax. T., Th., 12, *White 1 B.* Assistant Professor O. F. EMERSON.

The course includes an introduction on the relation of English to other Indo-European languages; a short account of the great periods of English linguistic history, and the main influences affecting the speech; a history of the English vocabulary, including the native and foreign elements; a brief history of English sounds, and the principles of English etymology, besides a somewhat fuller account of English inflexions and syntax.

11. **Phonetics with special reference to English.** Fall term; Sweet's Primer of Phonetics, with supplementary lectures. Winter and spring terms; Sweet's Primer of Spoken English, with special study of American English. F., 12, *White 1 B.* Assistant Professor O. F. EMERSON.

The aim of the course is to emphasize the importance of phonetics in linguistic study, the actual work and the illustrative material having special relation to English. The second and third terms are devoted to the history of English sounds and to American English in its relation to the English of Great Britain. For the latter work the special text book is Sweet's History of English Sounds, Oxford, 1888.

12. **Old Saxon.** For students who have passed in 7a. Assistant Professor O. F. EMERSON. Winter and spring terms; Behagel-Gallée, *Altsächsische Grammatik*; readings from the *Heliand*. Hours to be determined hereafter.

13. **Icelandic.** For students who have taken course 7a. Professor HART. Winter and spring terms; Noreen, *Altisländische Grammatik*; readings from the *Elder Edda*. Hours to be determined hereafter.

The object of course 13 is to impart some practical knowledge of Icelandic for the purpose of comparison with English; also to afford insight into the peculiar mythological conception underlying the poetry of the *Edda*.

14. **Germanic Philology.** For students who have taken course 7a or Comparative Philology 1 or 2. Lectures upon the Germanic elements in Brugmann's *Grundriss*; winter and spring terms. Hours to be determined hereafter. Professor HART.

In course 14 an effort is made to bring together such of Brugmann's generalizations concerning Indo-European vowels and consonants, word-formation, and inflexion, as are directly available for the study of Gothic, English, German, and Icelandic, and to reconstruct the

primitive forms of Teutonic from which the actual forms have been evolved.

Through the acquisition of the Zarncke collection the facilities for the study of English, German, and Icelandic philology are practically complete. The English and German seminary rooms, in which are kept the texts, dictionaries, and grammars most in demand, are open from 8 A. M. to 9.30 P. M. to all graduate students specializing in philology. Other works are always procurable from the general library on demand.

THE ROMANCE LANGUAGES.

6. **Origin and development of the French language and literature down to the XVIIth century.** Lectures. S., 9, *White 12*. Professor CRANE. Open to those who have had courses 1 and 2.

The object of this course is to give a rapid survey of the field of study and of the principal guides to its various divisions. The Romanization of the provinces, especially Gaul (see Budinszky, *Die Ausbreitung der Lateinischen Sprache über Italien und die Provinzen des römischen Reiches*), the nature of the Latin introduced into the provinces (see Schuchardt, *Vocalismus des Vulgärlateins*, and Meyer in Gröber's *Grundriss*), the Germanic invasion (see Kluge in Gröber's *Grundriss*) and the subsequent modification of the language (see Brunot, *Grammaire historique de la langue française*) are some of the topics treated. For the literature the student is referred to G. Paris, *La littérature française au moyen âge*, Darmesteter and Hatzfeld, *Le seizième siècle en France*, and for a general survey of the whole field, Lintilhac's *Précis historique et critique de la littérature française*. In the lectures only the great classes of literature such as the epic, drama, lyric poetry, etc., are rapidly characterized.

8. **Romance Seminary.** Phonetics, early French, Provençal, or Spanish texts, etc. T., Th., 9, *French Seminary Room*. Mr. OTTO. Open only to students in Arts and Philosophy who have had courses 1, 2. (The hours may be changed if found desirable.)

The subject is treated from the standpoint of Comparative Romance Philology.

(a) The essentials of historical French grammar (phonetics and morphology of the langue d'oïl. Interpretation of the earliest French documents and selections from the *Chanson de St. Alexis*, the *Chanson de Roland*, and from the works of Chrestiiens de Troyes.

(b) Historical treatment of the sounds and inflexional system of the Old-Provençal language. Reading of selections from Bartsch's *Chrestomathie provençale*.

THE GERMANIC LANGUAGES.

6. **Old High German and Old Saxon.** Selections from Otfrid's *Evangelienbuch*, Isidore, the *Heliand*, and other specimens of Old German. M., W., 12, *Morrill 21*. Dr. JONES.
9. **German Seminary.** For teachers and advanced students. Introduction to the study of German philology. (a) First half-year: historical grammar and the principles of the formation of the German language. (b) Second half-year: Middle High German, introductory course in epic poetry and prose. T., Th., 11. Professor HEWETT.
10. **German Seminary, Luther's Writings**, including an examination of his translation of the New Testament in different editions from 1522 to 1892, and a comparison with the pre-Lutheran, Catholic and Swiss versions. M., W., 9. Professor White.

CLASSICAL ARCHÆOLOGY AND HISTORY OF ART.

The courses in this department are entirely elective, but generally presuppose such an acquaintance with the Greek and Latin languages and literatures, and with ancient history, as students who have completed the earlier courses in classics possess. The course in the history of ancient architecture is, however, planned primarily for technical students. Course I is the best introduction to the studies of the department, and also connects directly with the courses on private life, which are offered in the Latin and Greek departments. The newly organized University Museum of Classical Archæology effectively equips the department with the means of studying and appreciating the beauties, spirit, and meaning of ancient art. Lantern slides, charts, and other materials enable the instructor to accompany his systematic courses with the needed illustrations. All members of the University are encouraged to make the utmost use of these facilities of the department. The Curator of the Museum is present for personal consultation at regular hours.

1. **Classical Archæology.** Fall term: history, scope, and methods of archæological science, especially as dealing with the remains of ancient civilization (ruins and antiques) in the Mediterranean countries; the art of the ancients in tissues, pottery, metal work, including coinage, wood and ivory carving, stone and gem carving, and color, with particular reference to classical architecture, sculpture, and painting. An illustrated course. Winter term: the topography and archæology of Greece, more especial-

ly of Athens and Olympia. Spring term : topography and archæology of Italy, especially of Rome and Pompeii. W., F., 11, *Morrill* 3. Associate Professor ALFRED EMERSON.

This course should be taken only by classical students, who are beyond finding a particular difficulty in frequent references to the text of Greek and Latin authors, or the multitude of proper names, etc. There should be previous familiarity with classical geography and history, public and private antiquities, and the literatures of Greece and Rome, as well as the ancient languages. The aim of the course is to introduce students who have completed or nearly completed an undergraduate course in Arts, to the materials and methods of specifically archæological information and research, and to equip future classical teachers in this direction.

2. **History of Architecture.** Ancient. M., W., F., 9. Fall term. For mediæval, renaissance, and modern, see under Architecture. Professor BABCOCK.

In this course, which is open to students in the other general courses as well as to those engaged in the professional study of architecture, the leading ancient styles (Egyptian, Assyrian, Persian, Greek and Roman), and forms of architectural construction and design are discussed, with unusual fullness of illustration and comparison. It offers the classical student a thorough, though rapid, survey of a subject of which he can ill afford to be ignorant, assisting him at the same time in obtaining a certain amount of technical insight.

3. **History of Sculpture from antiquity to the present day.** An illustrated course. Fall term : antique and early Christian period. Winter term : mediæval period and Italian Renaissance. Spring term : modern sculpture. Associate Professor A. EMERSON.

The scope of this course is altogether historical and critical. In the opening term, the Museum of Classical Archæology furnishes the best possible opportunity for approaching the sculptured work of the ancient masters in the most direct manner. In the two subsequent terms photographic illustration will be the only resource. Toward the close the work of the French school will naturally receive the greatest amount of attention.

Not given in 1895-96.

4. **History of Painting from antiquity to recent times.** An illustrated course. Fall term : antique and early Christian period. Winter term : mediæval period and Italian Renaissance. Spring term : modern painting. T., Th., 10, *Morrill* 3. Associate Professor A. EMERSON.

The illustration of this course is in the nature of things far less adequate than that of the parallel course in sculpture, owing to the difficulty of securing and presenting adequate reproductions of the texture and color of the originals, on which their effect so largely depends. An additional difficulty is created by the absolute destruction of the celebrated paintings of antiquity, whereas for the later development of the art of painting the very abundance of materials is apt to prove confusing. The character of the course as a whole will for this reason be varied from a maximum of discussion with a minimum of illustration at the outset to the exact reverse toward the close.

5. **Studies in the Museum of Casts.** A peripatetic introduction to the large University collection of plaster casts from the antique, will serviceably supplement the above courses, or may be taken independently. S., S, through the year. Assistant Professor A. EMERSON.

The purpose of this course is to approach the works of ancient plastic art directly, the instructor offering in the presence of each group of sculptures or single statue, bust, and bass-relief only so much of information and commentary as may be likely to give precision to aesthetic enjoyment. Mythology, the differences of national styles and of local schools of sculpture in antiquity, the characteristic problems and their solution in different branches of sculpture, the works and influence of the great masters, were among the subjects considered in this way in 1894-5. In each term participants in the course prepare an essay on a noted work or group, from personal impressions.

6. **Archæological Seminary.** A training course for classical students sufficiently conversant with Greek and Latin literature. Fall term ; archæological readings in classical authors and modern publications. Winter term ; exercises in the interpretation of monuments, and thesis work. Spring term ; practical and individual work. F., 2.30 to 4.30. Associate Professor A. EMERSON.

This work is intended primarily for advanced classical students, who contemplate adding some thorough training in archæology to their acquirements in the linguistic and historical branches of classical scholarship. The object of the course as a whole is to place the student in a position to conduct independent investigation along lines pertaining to classical archæology and art.

7. As curator of the Museum of Casts, Dr. Emerson will at regular hours be ready to meet students and others wishing direction in the study of the collection under his charge. The Museum is as a rule open daily from 12 to 5. The curator will be in his office at the Museum daily, except Monday, from 12 to 1.

FACILITIES FOR STUDY.

THE UNIVERSITY LIBRARY.

The Library contains one hundred and fifty thousand volumes, besides some twenty-seven thousand pamphlets. It is made up largely of the following collections, increased by annual additions of from three thousand to five thousand volumes: THE ANTHON LIBRARY, of nearly seven thousand volumes, consisting of the collection made by the late Professor Charles Anthon, of Columbia College, in the ancient classical languages and literatures; THE BOPP LIBRARY, of about twenty-five hundred volumes, relating to the oriental languages and literatures and comparative philology, being the collection of the late Professor Franz Bopp, of the University of Berlin; THE GOLDWIN SMITH LIBRARY, of thirty-five hundred volumes, comprising valuable editions of the ancient classics; THE RHÆTO-ROMANIC COLLECTION, containing about one thousand volumes, presented by Willard Fiske, in 1891; THE PRESIDENT WHITE HISTORICAL LIBRARY, of about twenty thousand volumes (including bound collections of pamphlets) and some three thousand unbound pamphlets, the gift of ex-President White, received in 1892, especially rich in the primary sources of history. The valuable library of the late Professor F. Zarncke, of Leipzig, containing about thirteen thousand volumes and pamphlets, especially rich in Germanic philology and literature.

As a working library in the fields of classical and comparative philology the University collection is one of rare excellence and completeness. It is particularly rich in periodical literature, possessing complete sets of all current philological journals, as well as of the transactions of the chief learned societies. The editions of classical writers, both critical and exegetical, are very completely presented, including many old editions of great value. In the fields of Comparative Philology and of Greek and Latin grammar, the equipment is practically complete, both in the earlier and the more recent literature. Latin syntax is represented with great completeness in the widely scattered monographic literature so difficult to bring together.

The University Library Building embodies every modern principle of library construction. It is heated by steam from the central heating station, is provided with a thorough system of artificial ventilation and fully equipped with incandescent electric lights. The reading room contains ample accommodation for two hundred and twenty readers, and the open bookcases around its walls provide shelf-room for a carefully selected reference library of eight thousand volumes. All the various rooms of the building are open every week day from 8 A. M. to 9.30 P. M., except on Saturday, when they are closed at 5 P. M.

THE GREEK AND LATIN SEMINARY ROOM.

A large room in the University Library Building is set apart as a special work-room for the advanced students in Greek and Latin. Each student who is admitted to the privileges of the room is assigned a regular seat at one of the tables, which becomes his place of work for the year. The room accommodates about thirty students. It is open from 8 a. m. to 9.30 p. m., and is lighted in the evening. The books which are permanently deposited in the room number at present about two thousand, but besides these there are temporarily transferred to the room from the general library a large number of books to meet from time to time the needs of the work in the seminaries. The student is able therefore, to do his work in direct connection with a specially selected reference library of about 2,500 volumes. The permanent book-equipment of the room includes the following complete series of journals and serial publications :

(1) Rheinisches Museum,	Bezenberger's Beiträge,
Hermes,	Mémoires de la Société de Linguistique,
American Journal of Philology,	Kuhn und Schleicher's Beiträge,
Journal of Philology,	Brugmann-Osthoff, Morpholog.
Jahrbücher für Philologie und Pädagogik,	Untersuchungen,
Neue Jahrbücher,	Brugmann-Streitberg, Indogerm.
Philologus,	Forschungen,
Philologischer Anzeiger,	Techmer's Internationale Zeitschrift,
Journal of Hellenic Studies,	Wölfflin's Archiv für latein. Lexicographie,
Rivista di Filologia Classica,	Curtius' Studien,
Revue de Philologie,	Leipziger Studien,
The Classical Review,	Wiener Studien,
Mnemosyne,	Breslauer Philol. Abhandlungen,
Berliner Philologische Wochenschrift,	Berliner Studien,
Jahresbericht über die Fortschritte der class. Altertumswiss.,	Dissertationes Philol. Argentoratenses,
American Journal of Archæology,	Dissertationes Philol. Halenses,
Archäologische Zeitung,	Commentationes Jenenses,
Revue Archéologique,	Harvard Studies,
Mittheilungen des deutschen Archäol. Instituts zu Athen,	Cornell Studies,
Bulletin de correspondance Hellénique,	Kiessling-von Wilamowitz, Philol. Untersuchungen,
Papers of American School of Class. Studies,	Ephemeris Epigraphica,
Kuhn's Zeitschrift,	Schanz, Beiträge zur histor. Syntax.

In the adjoining seminary rooms of the French, German, and English departments, to which the members of the Greek and Latin seminaries also have access, are found sets of various other important journals, such as the *Germania*, *Zeitschr. für deutsches Altertum*, *Paul und Braune's Beiträge*, *Anglia*, *Romania*.

(2) A large and approximately complete collection of dictionaries and lexicons of the classical languages, including concordances, indexes, special lexicons, etymological dictionaries, dictionaries of antiquities, geography, biography, as well as a collection of standard dictionaries of other languages, as Sanskrit, German, French, Italian, English, etc.

(3) Collections of Greek and Latin texts, including a complete set of the Teubner texts.

(4) A practically exhaustive collection of the published Greek and Latin Inscriptions: *e. g.*, *Corpus Inscriptionum Graecarum*, *Corpus Inscriptionum Latinarum*, *Corpus Inscriptionum Atticarum*, *Inscriptiones Graecæ Antiquissimæ*, *Ancient Greek Inscriptions of the British Museum*, *Loewy's Inschriften Griech. Bildhauer*, *Dittenberger's Sylloge Inscriptionum Graec.*, *Collitz' Sammlung der griech. Dialekt-inschriften*, *Le Bas, Voyage Archéologique*, *Museo Italiano, Inscriptiones Latinæ Antiquissimæ*, *Inscriptiones Neapolitanae*, also the collections of *Rangabé*, *Kumanudes*, *Larfeld*, *Hicks*, *Cauer*, *Kaibel*, *Robert*, *Zuetaieff*, *Dessau*, *Garrucci*, *Wilmanns*, *Lattes*, etc.

(5) The most essential manuals of reference in ancient history, antiquities, history of literature, grammar, dialects.

MUSEUM.

The Museum of Classical Archæology is composed chiefly of casts representing the history of Greek and Roman sculptural art, and is also supplied with various plans, models, reconstructions, fac-similes of coins, etc. The nucleus of the collection was purchased with a fund given for the purpose by the Hon. Henry W. Sage.

The museum occupies a room ninety-four feet in length by fifty-two in breadth, which space is greatly expanded, practically, through separation into galleries and alcoves by means of curtains hung between columns. Its interior architecture and decoration have been managed largely in imitation of the antique, mainly in the simpler Greek forms, while the office of the museum has the gay wall decoration of a Pompeian room. The collection itself consists principally of full-size reproductions of the best and most widely known antique sculptures, from the colossal and life-size figures down to the miniature bronze statuettes and terra-cotta figurines. The number of plaster-casts, not including the prints from ancient engraved gems, but including statu-

ary proper, relief sculptures, and statuettes, exceeds five hundred pieces.

THE CORNELL STUDIES IN CLASSICAL PHILOLOGY.

This series of papers and monographs is intended to afford an opportunity for the publication of material which either from the nature of the subject or the extent and completeness of the treatment is better suited to a distinct volume than to the pages of the current journals. It limits itself to work done at Cornell University by teachers or students. It is not a journal, but a series of monographs appearing at indeterminate intervals. Published by Ginn & Company, Boston, Mass. The following numbers have already appeared :

I. The *cum*-Constructions : their History and Functions. By William Gardner Hale. Part i : Critical ; 74 pp., 1887. Part ii : Constructive ; 189 pp., 1889,

II. Analogy, and the Scope of its Application in Language. By Benjamin Ide Wheeler ; 50 pp., 1887.

III. The Asklepios Cult. By Alice Walton ; 138 pp., 1894.

IV. The Development of the Athenian Constitution. By George Willis Botsford ; 249 pp., 1893.

V. Index Antiphonteus. By Frank Louis Van Cleef. 1895.

ADVANCED DEGREES.

MASTER OF ARTS.

The degree of Master of Arts is intended to represent a year of faithful work of an advanced character. It is conferred on those who have taken the corresponding baccalaureate degree here, or at some other college or university where the requirements for that degree are equal to those of this University, on the following conditions :

Candidates must spend at least one year at the University in pursuance of an accepted course of study. They must present a satisfactory thesis and pass a satisfactory examination on the major and minor subjects chosen for the degree.

DOCTOR OF PHILOSOPHY.

The degree of Doctor of Philosophy is conferred on the following conditions :

1. In order to become a candidate, the applicant must have pursued a course of study equal to that required for graduation in this University in the course of Arts or Philosophy.

2. The candidate must spend at least two years at the University pursuing a course of study marked out by the Faculty. In exceptional cases a year of graduate work in a university elsewhere may, by a spe-

cial vote of the Faculty, be accepted in place of a year's work in this University.

3. The candidate must present a thesis of such a character as shall display power of original and independent investigation, and must pass the requisite final examinations on one major and two minor subjects.

4. Successful candidates for the degree of Doctor must print their theses and deposit twenty-five copies in the Library.

EXPENSES.

The annual tuition fee in the courses in Arts and Philosophy and for graduates is \$100, \$40 to be paid at the beginning of the first term, \$35 at the beginning of the second, and \$25 at the beginning of the third.

The cost of living in Ithaca, including board, room, fuel and lights, varies from \$5 to \$10 per week. By the formation of clubs, students are sometimes able to reduce their expenses to \$4.50 per week for room and board, and occasionally to even less than that amount.

A fair estimate of the yearly expenses is from \$325 to \$600, but much depends upon the personal tastes of the student.

The cost for board, rent of furnished room, fuel, and lights, at the Sage College, which is exclusively for women, varies from \$5 to \$6.50 a week. A student occupying alone one of the best rooms pays \$6.50 a week. If two occupy such a room together the price is \$5.75. Those occupying less desirable rooms, with two in a room, pay \$5 a week each.

FELLOWSHIPS AND SCHOLARSHIPS.

A. For graduates: two fellowships in Greek and Latin, one graduate scholarship in comparative philology and archæology, and one in Greek and Latin. These are awarded by the general faculty of the University upon the recommendation of the departments of Greek and Latin.

These fellowships are intended for college graduates of high character and marked ability or high attainments. The annual income from the fellowships is \$500, and from the scholarships \$300. The tuition fee for the Fellows and Scholars is the same as for others. The term of each is one year, but the holder may be reappointed in exceptional cases.

B. For undergraduates. There will annually be thrown open to competition by all members of the freshman class who are registered in courses leading to degrees, at a special examination held directly after the September entrance examinations, eighteen scholarships of the annual value of two hundred dollars each.

For details concerning the examinations for these scholarships and for all further information address The Registrar of Cornell University, Ithaca, N. Y.

Cornell Univ.
Nov. 1905

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UNIVERSITY OF ILLINOIS LIBRARY

CORNELL UNIVERSITY.

LIST OF

GRADUATE STUDENTS

NOVEMBER, 1905.

APR 26 1917

PUBLISHED BY THE UNIVERSITY

ITHACA, N. Y.

1905

The number of candidates for advanced degrees during 1905-1906 is distributed as follows :

I. BY DEGREES.

A.M.,	33
M.S. in Agr.,	23
M.S. in Arch.	2
M.C.E.,	11
M.M.E.,	13
Ph.D.,	110
Total,	192

II. BY SUBJECTS.

SUBJECT.	Major Subject,	Minor Subject,	No. of Students
The Semitic Languages and Literatures,	1	0	1
Greek and Comparative Philology (including Classical Archæology),	4	9	9
Latin,	5	3	8
The Germanic Languages,	2	3	4
The Romance Languages,	3	6	6
English,	6	8	7
Philosophy,	13	23	16
Science and Art of Education,	1	0	1
History, Ancient,	1	4	5
Mediæval,	4	16	20
Modern European, and English,			
American,	4	6	10
Political Economy (including Politics, Statistics and Finance),	12	18	17
Mathematics,	13	20	22
Physics,	18	34	30
Chemistry,	21	27	24
Botany,	12	28	23
Entomology and General Invertebrate Zoology,	9	14	16
Physiology, Vertebrate Zoology and Neurology,	7	8	13
Histology and Embryology,	1	3	4
Geology, Paleontology and Mineralogy,	3	12	11
Medicine,	0	3	3
Agriculture,	27	33	32
Horticulture,	6	3	8
Veterinary Medicine,	4	7	6
Architecture,	3	1	3
Civil Engineering,	14	13	18
Mechanical Engineering,	15	14	17
Not candidates for a degree,			17
Honorary Fellows,			1
Graduate Students in Undergraduate Courses,			234

FELLOWS AND SCHOLARS.

UNIVERSITY FELLOWS.

The Cornell Fellowship,

Mary Aloysia Molloy, Ph.B., A.M. (Ohio State Univ.), *English*

The McGraw Fellowship,

William Franklin Martin, B.S., C.E. (Univ. of Texas),
Civil Engineering

The Sage Fellowship,

Helen Isham, A.B., *Chemistry*

The Schuyler Fellowship,

Leopold Reinecke, B.A. (Univ. of Cape of Good Hope),
Geology

The Sibley Fellowship,

Charles Knox Martin, B.S. in E.E. (Univ. of Mo.),
Mechanical Engineering

The Goldwin Smith Fellowship,

Ralph Edward Sheldon, A.B., A.M., *Neurology*

The President White Fellowship,

Elbert Barrett Tuttle, B.S. in E.E. (Iowa State College),
Physics

The Erastus Brooks Fellowship,

Paul Prentice Boyd, A.B. (Oberlin Coll.),
A.M. (Park Coll.), *Mathematics*

Charles Sherman Cobb, B. Arch., *Architecture*

Charles Eli Burgoon, B.M.E., M.E. (A. & M. Coll. of Texas),
Mechanical Engineering

Arthur Gordon, A.B., *Romance Languages*

Raymond Watson Jones, A.B., *Germanic Languages*

John Eliot Coit, B.S. in Agr. (North Carolina A. & M. Coll.),
Agriculture

PRESIDENT WHITE FELLOWS IN HISTORY AND POLITICAL SCIENCE.

Burdette Gibson Lewis, A.B. (Univ. of Nebraska).

Edna Virginia Moffett, A.B. (Vassar Coll.), A.M. (Cornell Univ.).

FELLOWS IN POLITICAL ECONOMY.

Oliver Cary Lockhart, A.B., A.M. (Univ. of Indiana).

Harry Garfield Nutt, B.S. (Dartmouth).

FELLOWS IN LATIN AND GREEK.

Lynn Boal Mitchell, A.B. (Ohio State Univ.), A.M. (Cornell Univ.),
Margaret Otis, A.B.

FELLOW IN AMERICAN HISTORY.

Ethel Zirley Rather, A.B., M.A. (Univ. of Texas).

SUSAN LINN SAGE FELLOWS IN PHILOSOPHY.

William Louis Bailey, M.A. (Queen's Univ.).
Samuel Perkins Hayes, A.B. (Amherst), A.M. (Columbia Univ.),
B.D. (Union Theo. Sem.)
George Holland Sabine, A.B.

FELLOW IN ARCHITECTURE.

Julius André Smith, B.Arch, M.S. in Arch.

HONORARY FELLOWS.

James Allen Nelson, Ph.B. (Kenyon Coll.), Ph.D. (Univ. of Penn.),
Entomology

GRADUATE SCHOLARS IN THE SCHOOL OF PHILOSOPHY.

Gus Watts Cunningham, M.A. (Furman).
Mattie Alexander Martin, A.B.
Frank Davis Mitchell, A.B.
Elsie Murray, A.B.
Robert Benjamin Waugh, A.B. (Hobart Coll.).
Mary Cheves West, B.S. (Columbia Univ.).

UNIVERSITY GRADUATE SCHOLARS.

Floyd Cooper Fairbanks, A.B., A.M. (Univ. of Rochester), *Physics*
Albert Davis, A.B., A.M. (Columbia Univ.), *English*
William Dodge Gray, A.B. (Univ. of Ark.), A.M. (Cornell Univ.),
Greek and Latin
Caroline Louise Allen, A.B., *Botany*
Myrta Eleanor Hunn, A.B., *Comparative Philology and Archaeology*
Thomas J Headlee, M.A. (Indiana Univ.), *Entomology*
Roscoe Milliken Packard, A.B., A.M., (Western Reserve Univ.),
Civil Engineering
Frank Curry Mathers, A.B, A.M. (Indiana Univ.), *Chemistry*
Clyde Furman Craig, A.B. (Univ. of Mich.), *Mathematics*
ou ise Fargo Brown, A.B., *History*

UNIVERSITY UNDERGRADUATE SCHOLARSHIPS.

SOPHOMORE CLASS.

THE CORNELL SCHOLARSHIPS,

Eleanor Elizabeth Churchill, *Course in Arts*

Buffalo Central High School—Frederick A. Vogt, Principal.

Mather Francis Thurston, *Course in Arts*

Hamburg High School—Benjamin G. Estes, Ph.B., Principal.

THE H. B. LORD SCHOLARSHIPS,

Robert Eugene Samuels, *Course in Arts*

Boys' High School, Brooklyn—John Mickleborough, D.D., Principal.

Romeyn Yatman Thatcher, *Course in Arts*

Buffalo Central High School—Frederick A. Vogt, Principal.

THE MCGRAW SCHOLARSHIPS,

Mayne S Howard, *Course in Arts*

Ten Broeck Academy—Hamilton Terry, A.B., Principal.

Fayette Andrus Cook, *Course in Mechanical Engineering*

Ithaca High School—F. D. Boynton, M.A., Principal.

THE SAGE SCHOLARSHIPS,

Freda Zorn, *Course in Arts*

Girls' High School, Brooklyn—Wm. L. Felter, Ph.D., Principal.

Alice Laura Clark, *Course in Arts*

Northfield Seminary—Evelyn S. Hall, B.A., Principal.

THE SIBLEY SCHOLARSHIPS,

Donald Stewart, *Course in Mechanical Engineering*

Boys' High School, Brooklyn—John Mickleborough, D.D., Principal.

James Wallace Marshall, *Course in Mechanical Engineering*

Pittsburgh Academy—J. C. Armstrong, Principal.

THE PRESIDENT WHITE SCHOLARSHIPS,

George Paaswell, *Course in Civil Engineering*

De Witt Clinton High School—J. T. Buchanan, Principal.

Harry Ames Richards, *Course in Arts*

Batavia High School—E. A. Ladd, Ph.D., Principal.

THE HORACE GREELEY SCHOLARSHIPS,

Bruno Charles Lechler, *Course in Civil Engineering*

Brooklyn Eastern District High School—W. T. Vlymen, Ph.D., Principal.

Emma Florence Strang, *Course in Arts*

Waterloo High School—Harry B. Smith, A.B., Principal.

THE JOHN STANTON GOULD SCHOLARSHIPS,

David Theodore Smith, *Course in Law*

Brooklyn Eastern District High School—W. T. Vlymen, Ph.D., Principal.

Claire L. Southworth, *Course in Arts*

Holley High School—H. D. Bartlett, Principal.

THE STEWART L. WOODFORD SCHOLARSHIPS,

George Frederick Rogalsky, *Course in Arts*
North Tonawanda High School—E. A. Smith, M.A., Principal.
Ross Peter Anderson, *Course in Arts*
South Butler High School—L. J. Cross, Principal.

FRESHMAN CLASS.

THE CORNELL SCHOLARSHIPS,

Russell Vincent Banta, *Course in Civil Engineering*
Boys' High School, Brooklyn—John Mickleborough, Ph.D., Principal.
Mattie Charlotte Moffett, *Course in Arts*
Middletown High School—Wm. A. Wilson, A.B., Principal.

THE H. B. LORD SCHOLARSHIPS,

Frederick Adolph Rice, *Course in Arts*
Boys' High School, Brooklyn—John Mickleborough, Ph.D., Principal.
Edwin Charles Mayer, *Course in Arts*
Erasmus Hall High School—Walter Gunnison, Ph.D., Principal.

THE MCGRAW SCHOLARSHIPS,

William Alphonsus Shea, *Course in Arts*
Brockport Normal School—C. T. McFarlane, Principal.
David Tolins, *Course in Law*
Boys' High School, Brooklyn—John Mickleborough, Ph.D., Principal.

THE SAGE SCHOLARSHIPS,

Anna Belle Genung, *Course in Arts*
Ithaca High School—F. D. Boynton, D.Pd., Principal.
Alice Welles Benham, *Course in Arts*
Cortland Normal School—F. J. Cheney, Ph.D., Principal.

THE SIBLEY SCHOLARSHIPS,

George Gordon Dobson, *Course in Mechanical Engineering*
Passaic High School—A. D. Arnold, Principal.
Tom Bruce Hyde, *Course in Mechanical Engineering*
Ithaca High School—F. D. Boynton, D.Pd., Principal.

THE PRESIDENT WHITE SCHOLARSHIPS,

Everett Magnon York, *Course in Arts*
Flushing High School—John Holley Clark, A.M., Principal.
Helen Frances Dwyer, *Course in Arts*
Hartford High School, Conn.—E. H. Smiley, Principal.

THE HORACE GREELEY SCHOLARSHIPS,

Freda Kiso, *Course in Arts*
Eastern District High School, Brooklyn—Wm. S. Vlymen, Principal.
Loring DeLacy Jones, *Course in Arts*
Boys' High School, Brooklyn—John Mickleborough, Ph.D., Principal.

THE JOHN STANTON GOULD SCHOLARSHIPS,

Emil Adler, *Course in Mechanical Engineering*
Masten Park High School—F. S. Fosdick, M.A., Principal.
Peter Thomas Vanderwaart, *Course in Mechanical Engineering*
Norwich Free Academy—H. A. Tirrell, Principal.

THE STEWART L. WOODFORD SCHOLARSHIPS,

Fritz Fernow, *Course in Arts*

Ithaca High School—F. D. Boynton, D.Pd., Principal.

Charles Chadowitz, *Course in Arts*

Boys' High School, Brooklyn—John Mickleborough, Ph.D., Principal.

ASSOCIATE ALUMNAE SCHOLAR.

Charlotte Everest Shumway,

Course in Arts

FRANK WILLIAM PADGHAM SCHOLAR.

William Kahl,

Course in Mechanical Engineering

BOARDMAN SENIOR LAW PRIZE.

Arthur Brothers Weber,

Course in Law

CATALOGUE OF STUDENTS.

GRADUATES.

Candidates for Advanced Degrees.

* *In absentia.*

** *Not in residence 1905-06.*

† *Not Candidates for Degrees.*

Adams, Joseph Quincy, Jr., A.B. (Wake Forest College), A.M. (same),
Charlotte, N. C.

English, Italian. *Ph.D.*

[English Literature, Italian Literature, English Language.]

Committee: Hart, Crane, Strunk.

Albert, Calvin Dodge, M.E., 1902, *Ithaca*
Mechanical and Civil Engineering. *M.M.E.*

[Mechanical Engineering, Hydraulics.]

Committee: Carpenter, Church.

Allen, Caroline Louise, A.B., 1904, *Buffalo*
Botany. *A.M.*

[Botany (Mycology), Plant Histology.]

Committee: Atkinson, Rowlee.

Apgar, Clara Selkreg, A.B., 1905, *Ithaca*
Latin, English. *A.M.*

Committee: Bennett, Hart.

Aronovici, Charles, B.L. (Gymnasium of Roumania), 1898, B.S.A.
(Cornell), 1905, *Ithaca*

Agriculture, History and Political Science. *Ph.D.*

[Rural Economy, Rural Sociology, Economics and Statistics.]

Committee: Bailey, Lauman, Willcox.

Austin, Blanche Tudor, B.S. (Wells), 1895, A.M. (Cornell Univ.), 1905,
Cincinnati, O.

Vertebrate Zoology, Entomology. *Ph.D.*

Committee: Wilder, Comstock.

Bader, William John, A.B. (Univ. of Ill.), 1902, *Quincy, Ill.*
Chemistry. *Ph.D.*

[Inorganic, Organic and Physical Chemistry.]

Committee: Dennis, Orndorff, Bancroft.

Bailey, William Louis, A.M. (Queen's Coll.), 1904,
Gravenhurst, Canada

Philosophy. *Ph.D.*

[Logic and Metaphysics, Ethics, Psychology.]

Committee: Creighton, Hammond, Titchener.

**Betten, Cornelius, B.A. (Lake Forest Univ.), 1900, M.A. (same), 1901,
Lake Forest, Ill.

Entomology, Botany. *Ph.D.*

[Entomology (Systematic), Entomology (Ecology), Botany (Embryology).]

Committee: Comstock, Atkinson, Slingerland.

Black, John Alexander, A.B. (Univ. of Chicago), 1903, *Luna, O.*
Chemistry. *Ph.D.*

[Organic Chemistry, Physiological Chemistry, Analytical Chemistry.]

Committee: Orndorff, Chamot, Dennis.

Boothroyd, Samuel Latimer, B.S. (Col. Agr. Coll.), 1893, M.S. (same),
1904, *Ithaca*

Civil Engineering, Mathematics. *M.C.E.*

[Geodesy and Astronomy, Differential Equations.]

Committee: Crandall, Snyder.

Boyd, Paul Prentice, A.B. (Oberlin), 1898, A.M. (Park Coll.), 1900,
A.M. (Cornell), 1905, *Siloam Springs, Ark.*

Mathematics, Physics. *Ph.D.*

[Pure and Applied Mathematics, Theoretical Physics.]

Committee: Snyder, McMahon, Merritt.

†Breckenridge, William Edwin, A.M. (Yale Coll.), 1893, A.M. (same),
1902, *New York City*

Mathematics.

[Advanced Differential Calculus, Projective Geometry.]

Committee: Wait, Hutchinson.

Brown, George Henry, B.L. (Dartmouth Coll.), 1894, *Lebanon, N.H.*
Romance Languages. *A.M.*

[French Literature, Advanced French.]

Committee: Crane, Olmsted.

Brown, Louise Fargo, A.B., 1903, *Buffalo*
History, Geology. *Ph.D.*

[Modern European and Mediæval History, Physical Geography.]

Committee: Catterall, Burr, Tarr.

Brown, Mortimer Jay, B.S. (Univ. of Neb.), 1905, *Tecumseh, Neb.*
Chemistry, Physics, Geology. *Ph.D.*

[Chemistry, Physics, Economic Geology.]

Committee: Dennis, Nichols, Ries.

Burgoon, Charles Eli, M.E., *Estelle, Texas*
Mechanical and Electrical Engineering. *M.M.E.*

[Experimental and Electrical Engineering.]

Committee: Carpenter, Thomas, Norris.

- Burnett, Samuel Howard, A.B., 1892, M.S., 1896, D.V.M., 1902,
Webster
 Veterinary Medicine, Bacteriology, Histology. *Ph.D.*
 [Pathology, Bacteriology, Histology.]
 Committee : Moore, Gage.
- Butler, Bert S, A.B., 1905,
Wyoming
 Geology. *A.M.*
 [Mineralogy, Physiography.]
 Committee : Gill, Tarr.
- Camp, Arthur Dutton, A.B., 1905,
Montclair, N. J.
 Chemistry, Geology. *Ph.D.*
 [Analytical Chemistry, Inorganic Chemistry, Economic Geology.]
 Committee : Dennis, Chamot, Ries.
- Carruth, William Massey, A.B., 1901,
Cleveland, O.
 Mathematics, Physics. *Ph.D.*
 [Pure and Applied Mathematics, Physics.]
 Committee : Snyder, McMahon, Merritt.
- †Castle, Samuel Northrup, A.B. (Harvard), 1901,
Ithaca
 Mechanical Engineering.
 [Steam Engineering, Electrical Engineering.]
 Committee : Smith, Norris.
- Cates, Junius Sidney, B.Agr. (N. C. Coll. of A. and M.), 1902, M.Agr.
Sweepsonville, N. C.
 (same), 1904, Agriculture. *Ph.D.*
 [Agronomy, Animal Industry, Agricultural Chemistry.]
 Committee : Hunt, Wing, Cavanaugh.
- Cauthen, Edward Francis, B.S. (Univ. of Nashville), 1896,
Hamilton, Ala.
 Agriculture. *M.S. in Agr.*
 Committee : Hunt.
- †Cessna, John Randolph, M.E., 1893,
Ithaca
 Civil Engineering.
 Committee : Crandall.
- Chakravarty, Jatindra Nath, A.B. (Calcutta), 1902,
Calcutta, India
 Agriculture. *M.S. in Agr.*
 [Agronomy, Dairy Industry.]
 Committee : Hunt, Pearson.
- Clark, Charles Frederick, B.S. (Univ. of Vt.), 1897,
Glover, Vt.
 Agriculture, Botany. *M.S. in Agr.*
 [Agronomy, Botany (Physiology).]
 Committee : Hunt, Atkinson.
- Cobb, Charles Sherman, B.S. in Arch., 1905,
Albany
 Architecture. *M.S. in Arch.*
 [Architectural Design, Freehand Drawing.]
 Committee : Prévot, Brauner.

Cochran, Jerome, C.E. (A. & M. Coll. of Texas), 1904, B.S. in C.E.
(same), 1905, *Houston, Texas*

Civil Engineering. *M.C.E.*

[Structural and Sanitary Engineering,]

Committee : Crandall, Jacoby, Church, Ogden.

Cochrane, Harry Hamilton, B.S. (Trinity Coll., Hartford, Conn.),
1901, *Ithaca*

Electrical and Civil Engineering. *M.M.E.*

[Electrical Engineering, Hydraulic Engineering.]

Committee : Norris, Church, Bedell.

Coffin, Joseph Herschel, B.S. (Penn. Coll.), 1902, A.M. (same), 1904,
Oskaloosa, Iowa

Philosophy. *Ph.D.*

[Psychology, History of Philosophy, Ethics.]

Committee : Titchener, Creighton, Hammond.

Coit, John Eliot, B.S. in Agr. (North Carolina A. & M. Coll.), 1903,
M.S. in Agr. (Cornell), 1905, *Ithaca*

Agriculture, Botany. *Ph.D.*

Committee : Craig, Bailey, Rowlee.

**Collier, Theodore Frelinghuysen, A.B. (Hamilton), 1894, A.M.
(same), 1897, *Williamstown, Mass.*

History and Political Science. *Ph.D.*

[Modern European, Mediæval History, American History.]

Committee : Catterall, Burr, Hull.

Colpitts, Elmer Clifford, A.B. (Mount Allison Univ.), 1902,
Point de Bute, New Brunswick, Canada

Mathematics, Physics. *Ph.D.*

[Pure Mathematics, Applied Mathematics, Physics.]

Committee : Snyder, McMahon, Merritt.

Conant, Goldsmith Hall, A.B. (Bates Coll.), 1898, A.B. (Harvard
Univ.), 1903, *Littleton, Mass.*

Physics. *A.M.*

[Physics, Applied Electricity.]

Committee : Nichols, Bedell.

Coppock, Emma Ethleen, A.B. (Earlham Coll.), 1904,
Union Springs

German, French. *A.M.*

Committee : Hewett, Crane.

Cox, Edward Godfrey, A.B. (Wabash Coll.), 1899, A.M. (Cornell
Univ.), 1901, *Cleveland, O.*

English, History and Political Science. *Ph.D.*

[English Philology, Mediæval History, The Development of the
English Novel.]

Committee : Hart, Burr, Strunk.

- Craig, Clyde Firman, A.B. (Univ. of Mich.), *Des Moines, Iowa*
 Mathematics, Physics. *Ph.D.*
 [Mathematics (Pure and Applied), Physics.].
 Committee: Wait, McMahon, Merritt.
- Crampton, Guy Chester, A.B. (Princeton), 1904, A.M. (Cornell), 1905,
Mobile, Ala.
 Entomology. *Ph.D.*
 [Morphology of Insects, Economic Entomology.].
 Committee: Comstock, Slingerland.
- Crittenden, Eugene Casson, A.B., 1905, *Oswayo, Pa.*
 Physics. *Ph.D.*
 [Experimental and Theoretical Physics, Advanced Optics.].
 Committee: Nichols, Merritt, Shearer.
- Cunningham, Gus Watts, A.M. (Furman Univ.), 1902,
Birmingham, Ala.
 Philosophy, English. *Ph.D.*
 [Logic and Metaphysics, Ethics, English.].
 Committee: Creighton, Hammond, Albee, Hart.
- Curtis, Ralph Wright, B.S.A., 1901, M.S. in Agr., 1905, *Ithaca*
 Agriculture, Botany. *Ph.D.*
 [Agriculture (Nature Study), Horticulture, Systematic Botany.].
 Committee: Bailey, Craig, Rowlee.
- Daniels, Virgil Clayton, Ph.B. (Univ. of N. C.), 1904, A.M. (same),
 1905, *Oriental, N. C.*
 Chemistry, Physics. *Ph.D.*
 [Inorganic Chemistry, Physical Chemistry, Physics.].
 Committee: Dennis, Bancroft, Nichols.
- Davies, William Gomer, B.S. in C.E. (Univ. of Calif.), 1903,
Boise, Idaho
 Civil Engineering, Electrical Engineering. *M.C.E.*
 [Hydraulics, Electrical Engineering.].
 Committee: Crandall, Church, Norris.
- Davis, Albert, A.B. (Columbia Univ.), 1903, A.M. (same), 1904,
Brooklyn
 English, Philosophy. *Ph.D.*
 [English Literature, English, Philosophy.].
 Committee: Hart, Northup, Creighton, Hammond.
- **DeLaguna, Grace Andrus, A.B., 1903, *Tacoma, Wash.*
 Philosophy, History and Political Science. *Ph.D.*
 [Logic and Metaphysics, Ethics, Political Economy.].
 Committee: Creighton, Hammond, Albee, Fetter.
- Delbridge, Thomas G, A.B. (Union Coll.), 1903, *Batavia*
 Chemistry. *Ph.D.*
 [Organic Chemistry, Analytical Chemistry, Physiological Chemistry.].
 Committee: Orndorff, Chemot, Dennis.

- DeMajumdar, Indu Bhushan, A.B. (Calcutta Univ.), 1902.
East Bengal, India Agriculture. *M.S. in Agr.*
 [Agronomy, Horticulture.]
 Committee: Hunt, Craig.
- Dennison, Boyd Coe, M.E., 1904, *Binghamton*
 Mechanical Engineering. *M.M.E.*
 [Experimental Engineering, Electrical Machinery.]
 Committee: Carpenter, Norris.
- *Dodge, Lawrence Green, A.B. (Harvard Univ.), 1904, B.S.A. (Cornell Univ.), 1905, *Wenham, Mass.*
 Agriculture. *M.S. in Agr.*
 [Farm Management, Live Stock.]
 Committee: Hunt, Wing.
- Dorsey, Herbert Grove, B.S. (Denison Univ.), 1897, M.S. (same),
 1898, *Granville, O.*
 Physics, Mathematics. *Ph.D.*
 [Experimental and Theoretical Physics, Mathematics.]
 Committee: Nichols, Merritt, McMahon.
- Douglas, Gertrude Elizabeth, A. B. (Smith Coll.), 1904,
 Gardner, Mass.
 Botany. *A.M.*
 [Botany (Physiology), Botany (Comparative Histology of Plants.)]
 Committee: Atkinson, Rowlee.
- Dutt, Hira Laul, A.B (Calcutta), 1902, *Calcutta, India*
 Agriculture. *M.S. in Agr.*
 [Agronomy, Soils.]
 Committee: Hunt, Fippin.
- Edgerton, Claude Wilbur, B.S. (Univ. of Nebraska), 1903,
 Woodbine, Iowa
 Botany. *Ph.D.*
 [Botany (Mycology), Botany (Physiology), Botany (Systematic).]
 Committee: Atkinson, Rowlee.
- Edminster, Frank Custer, A. B , 1902, *Brooklyn*
 Mathematics. *A.M.*
 [Pure and Applied Mathematics.]
 Committee: Wait, McMahon.
- †Englert, Alfred, M.E., 1900, *Brooklyn*
 Mathematics, German.
 Committee: Wait, Hewett.
- †English, Andrew, D.V.M., 1905, *Ithaca*
 Veterinary.
 [Anatomy (Comparative), Pathology.]
 Committee: Hopkins, Moore.

- Evans, Emily Abigail, A.B. (Woman's Coll. of Baltimore), 1904,
Reisterstown, Md.
Comparative Anatomy of the Brain, Vertebrate Zoology. *A.M.*
Committee: Wilder, Comstock.
- Fairbanks, Floyd Cooper, A.B. (Univ. of Rochester), 1901,
Williamson
Physics. *Ph.D.*
[Experimental and Theoretical Physics, Advanced Optics.]
Committee: Nichols, Merritt, Shearer.
- Felldin, Jennie Wilhelmina Sophie, A.B., 1900,
Auburn
Latin, Greek. *A.M.*
Committee: Bennett, Sterrett.
- Fenner, Robert Coyner, M.E., 1904,
Ithaca
Physics. *A.M.*
[Experimental Physics, Theoretical Physics (Mechanical and
Thermodynamics).]
Committee: Nichols, Merritt.
- **Ferguson, Alexander McGarven, B.S.H. (Agr. and Mech. Coll. of
Texas), 1894, M.S. (same), 1896, *Austin, Texas*
Botany. *Ph.D.*
[Botany, (Physiology), Taxonomy of Angiosperms, Mycology.]
Committee: Atkinson, Rowlee.
- Fisher, Arthur William, Ph.B., 1898, A. M., 1899, *Pullneyville*
English, German. *Ph.D.*
[English Literature, German Philology, English Philology.]
Committee: Hart, Hewett, Prescott.
- Fisher, Willard James, A.B. (Amherst), 1892, *Woods Hole, Mass.*
Physics. *Ph.D.*
[Experimental Physics, Theoretical Physics, Mathematical Physics.]
Committee: Nichols, Merritt, Shearer.
- Fletcher, Philena Belle, B.S.A., 1904, *Bainbridge*
Entomology, Botany. *Ph.D.*
[Entomology (Bees of Cayuga Fauna), Botany (Mycology),
Pathological Histology of Plants.]
Committee: Comstock, Atkinson, Rowlee.
- *Fletcher, William Franklin, B.S.A., 1904, *Bainbridge*
Horticulture. *M.S. in Agr.*
[Horticulture (Frost Injuries of Fruit Trees).]
Committee: Craig.
- **Foord, James Alfred, B.S. (New Hampshire Coll.), 1898, M.S. in
Agr. (Cornell Univ.), 1902, *Newark, Del.*
Agriculture, Veterinary Medicine. *Ph.D.*
[Thremmatology, Dairy Husbandry, Agricultural Bacteriology.]
Committee: Wiug, Pearson, Moore.

- Foster, Herbert Hamilton, Ph.B., 1900, *Canandaigua*
 Science and Art of Education, Philosophy. *Ph.D.*
 [Education, Psychology, Philosophy.]
 Committee: DeGarmo, Titchener, Creighton.
- Frank, Joseph Julius, A.B. (Columbia Univ.), 1905, *New York City*
 Chemistry, Physics. *A.M.*
 Committee: Dennis, Nichols.
- Fraser, Samuel, (Cheshire Agr. and Hort. Coll., Eng.), 1898, M.S. in
 Agr. (Cornell), 1905, *Ithaca*
 Agriculture. *Ph.D.*
 [Timothy (Phleum pratense), The Improvement of Timothy by
 Selection (Phleum pratense), The Draft of Tillage Implements.]
 Committee: Hunt, Craig, Bailey.
- Freedlander, Abraham Abbey, A.B., 1905, *Buffalo*
 History and Political Science. *Ph.D.*
 [Politics, Modern European History, American History.]
 Committee: Jenks, Catterall, Farrand.
- Freeman, Henry Livingston, B.S. in E.E. (Ga. School of Technology),
 1900, *Atlanta, Ga.*
 Electrical Engineering, Mechanical Engineering. *M.M.E.*
 Committee: Norris, Carpenter.
- Gaehr, Paul Frederick, A.B., 1902, A.M., 1905, *Ithaca*
 Physics, Mathematics. *Ph.D.*
 [Experimental and Theoretical Physics, Mathematics.]
 Committee: Nichols, Merritt, McMahon.
- Gage, Otis Amsden, Ph.B. (Univ. of Rochester), 1899, *Bellona*
 Physics, Mathematics. *Ph.D.*
 [Experimental and Theoretical Physics, Mathematics.]
 Committee: Nichols, Merritt, McMahon.
- Gano, Laura, Ph.B. (Earlham Coll.), 1893, B.S. (Univ. of Chicago),
 1898, *Richmond, Ind.*
 Agriculture. *M.S. in Agr.*
 [Agronomy, History of Agriculture.]
 Committee: Hunt, Lauman.
- Gavett, George Irving, B.S. in C.E. (Univ. of Mich.), 1893, *Ithaca*
 Mathematics, Civil Engineering. *A.M.*
 Committee: Hutchinson, Jacoby.
- Gehring, Herbert August, C.E., 1903, *Portland, Me.*
 Civil Engineering. *M.C.E.*
 [Hydraulics, Structural Engineering.]
 Committee: Crandall, Church, Jacoby.
- Geissler, Ludwig Reinhold, B.L. (Univ. of Texas), 1905, *Ithaca*
 Philosophy. *Ph.D.*
 [Psychology, Logic and Metaphysics, Ethics.]
 Committee: Titchener, Creighton, Hammond, Albee.

- George, Sidney Gonzales, C.E., 1905, *Fredonia*
Civil Engineering. *M.C.E.*
[Mining Engineering, Applied Mechanics.]
Committee: Crandall, McCaustland, Church.
- Ghosh, Apurba Chandra, B.A. (Calcutta Univ.), 1901,
Dacca, Bengal, India
Agriculture. *M.S. in Agr.*
[Agronomy, Horticulture.]
Committee: Hunt, Craig.
- Gibbs, Elbert Allan, B.S. in C.E. (Univ. of Calif.), 1905, *Ithaca*
Civil Engineering *M.C.E.*
[Bridge Engineering, Advanced Mechanics.]
Committee: Crandall, Jacoby, Church.
- Goldenweiser, Emanuel A., A.B. (Columbia Univ.), 1903, A.M.
(Cornell), 1905, *Kiew, Russia*
History and Political Science. *Ph.D.*
[Economics and Statistics, Economics and Politics, American
History.]
Committee: Willcox, Jenks, Farrand.
- **Gordon, Arthur, A.B., 1904. *Caledonia*
Romance Languages. *A.M.*
[French, Spanish.]
Committee: Crane, Olmsted.
- Gray, William Dodge, A.B. (Univ. of Arkansas), 1900, A.M. (Cornell),
1903, *Little Rock, Ark.*
Latin, Greek, Ancient History. *Ph.D.*
Committee: Bennett, Sterrett, Sill.
- Gullion, Omar Ray, A.B. (Univ. of Missouri), 1904, *Maywood, Mo.*
Physiology and Pharmacology, Physiological Chemistry,
Bacteriology. *Ph.D.*
Committee: Kingsbury, Moore, Orndorff.
- Harris, Clarence Owen, A.B., 1898, *Ithaca*
Greek, Latin, Comparative Philology. *Ph.D.*
Committee: Sterrett, Bennett, Bristol.
- Hawkins, Frank, A.B., 1905, *Hamden Junction, O.*
Chemistry. *A.M.*
[Organic Chemistry, Analytical Chemistry]
Committee: Orndorff, Dennis.
- Hawley, Lee Fred, A.B., 1903, A.M., 1905, *East Randolph*
Chemistry, Geology. *Ph.D.*
[Inorganic Chemistry, Mineralogy, Physical Chemistry.]
Committee: Dennis, Gill, Bancroft.

- Hayes, Samuel Perkins, A.B. (Amherst), 1896, B.D. (Union Theological Seminary), 1902, M.A. (Columbia), 1902, *Rochester*
Philosophy, History and Political Science. *Ph.D.*
[Psychology, Modern Philosophy, Economics and Politics.]
Committee: Titchener, Creighton, Jenks.
- Hayhurst, Paul, A.B. (Missouri Univ.), 1904, *Dunkirk*
Entomology, Zoology. *Ph.D.*
[General Entomology, Economic Entomology, Vertebrate
Zoology.]
Committee: Comstock, Wilder, Slingerland.
- Headlee, Thomas J, A.B. (Indiana Univ.), A. M. (same) 1903, *Yeoman, Ind.*
Entomology. *Ph.D.*
[General Entomology, Invertebrate Zoology, Systematic
Entomology.]
Committee: Comstock, Slingerland.
- Helwig, Orestes Herbert, A.B. (Ohio Wesleyan), 1901, A.M. (same), *Gnadenhütten, O.*
1901, Latin, Greek, Ancient History. *Ph.D.*
Committee: Bennett, Sterrett, Sill.
- Hodge, Percy, A.B. (Western Reserve Univ.), 1892, B.S. (Case School
of Applied Science), 1894, *Hudson, O.*
Physics, Mathematics *Ph.D.*
[Experimental and Theoretical Physics, Mathematics.]
Committee: Nichols, Merritt, McMahon.
- Holcombe, Jobelle, B.A. (Univ. of Arkansas), 1898, *Springdale, Ark.*
English. *A.M.*
[English Literature, English Philology.]
Committee: Hart, Northup.
- Homer, William Harrison, B.S. (Utah Agr. Coll.), 1900, *Logan, Utah*
Agriculture, Botany. *M.S. in Agr.*
[Horticulture, Botany, (Histology.)]
Committee: Craig, Rowlee.
- Hopkins, Richard, B.C.E. (Iowa State Coll.), 1903, *Nevada, Ia.*
Civil Engineering. *M.C.E.*
[Municipal and Railway Engineering, Concrete Steel Construction.]
Committee: Crandall, Church, Ogden, Jacoby.
- Hosford, George Wheeler, B.S.A., 1902, M.S. in Agr., 1905, *Mexico*
Agriculture. *Ph.D.*
Committee: Craig, Bailey, Hunt.
- Howitt, John Eaton, B.S.A. (Toronto Univ.), 1905, *Guelph, Ontario, Canada*
Horticulture, Entomology. *M.S. in Agr.*
Committee: Craig, Comstock.

- Hoxie, Robert Franklin, Ph.B. (Univ. of Chicago), 1893, *Ithaca*
 History and Political Science. *Ph.D.*
 [Economics, Political Science, Modern European History.]
 Committee : Fetter, Jenks, Catterall.
- Hunn, Myrta Eleanor, A.B., 1899, A.M., 1900, *Batavia*
 Greek, Latin, Classical Archæology. *Ph.D.*
 Committee : Sterrett, Bennett.
- Huntington, Charles Clifford, B.S. (Antioch Coll.), 1896, Ph.B. (Ohio
 State Univ.), 1902, A.M. (same), 1903, *Yellow Springs, Ia.*
 History and Political Science, Geology. *Ph.D.*
 [Economics and Finance, Physical Geography, Economics and
 Politics.]
 Committee : Fetter, Tarr, Jenks.
- Irons, Martin Joshua, B.C.E. in B.S. (Cornell Coll.), 1892,
Ft. Worth, Texas
 Agriculture, Geology. *Ph.D.*
 [Horticulture, Physiography, Soils.]
 Committee : Craig, Tarr.
- Isham, Helen, A.B., 1903, *Buffalo*
 Chemistry, Physics. *Ph.D.*
 [Inorganic Chemistry, Organic Chemistry, Physics.]
 Committee : Dennis, Orndorff, Nichols.
- Jarvis, Chester Deacon, B.S.A. (Toronto Univ.), 1899,
Montreal, Canada
 Agriculture, Entomology. *Ph.D.*
 [Olericulture, Pomology, Entomology.]
 Committee : Craig, Comstock.
- *Jeffers, Henry Williams, B.S. in Agr., 1897, *Plainsboro, N. J.*
 Agriculture. *M.S. in Agr.*
 [Dairy Industry, Animal Industry.]
 Committee : Wing, Pearson.
- Jennings, Fred Huntington, A.B., 1902, *Moravia*
 Chemistry, Geology. *Ph.D.*
 [Inorganic Chemistry, Sanitary Chemistry, Economic Geology.]
 Committee : Dennis, Chamot, Ries.
- **Johnson, Thomas Carskadon, B.S. in Agr. (West Va. Univ.), 1896,
 A.M. (same), 1900, *Morgantown, W. Va.*
 Horticulture, Entomology. *Ph.D.*
 [Horticulture, Entomology, Landscape Gardening.]
 Committee : Bailey, Comstock.
- Jones, Raymond Watson, A.B., 1905, *Albany*
 Modern and Romance Languages. *Ph.D.*
 [German Language, German Literature, Romance Philology.]
 Committee : Crane, Hewett.

- **Kauffman, Calvin Henry, A.B. (Harvard), 1896 *Lebanon, Pa.*
 Botany, Chemistry. *Ph.D.*
 [Botany (Plant Physiology, Mycology), Organic Chemistry.]
 Committee: Atkinson, Rowlee, Orndorff.
- **Knowlton, Daniel Chauncey, A.B., 1898, *Ithaca*
 History and Political Science. *Ph.D.*
 [Modern European History, Mediæval History, American History.]
 Committee: Catterall, Burr, Hull.
- Krauskopf, Francis Craig, A.B. (Indiana Univ.), 1904, *Maywood, Ill.*
 Chemistry. *A.M.*
 [Inorganic Chemistry, Sanitary Chemistry.]
 Committee: Dennis, Chamot.
- Krecker, Frederick Hartzler, A.B. (Princeton), 1904,
East Orange, N. J.
 Entomology. *A.M.*
 [Insect Morphology, Economic Entomology.]
 Committee: Comstock, Slingerland.
- *Kunze, Edward J, B.S. (Cooper Union), 1899, M.E. (Cornell Uni-
 versity), 1901, *New York City*
 Mechanical Engineering. *M.M.E.*
 [Mechanical Engineering, Machine Design, Thermodynamics]
 Committee: Smith, Carpenter, Kimball.
- Lewis, Burdette Gibson, A.B. (Univ. of Nebraska), 1904
Omaha, Neb.
 History and Political Science. *Ph.D.*
 [Economics and Politics, Economics and Finance, Modern
 European History.]
 Committee: Jenks, Fetter, Catterall.
- Lewis, Claude Isaac, B.S. (Mass. Agr. Coll.), 1902, B.S. (Boston
 Univ.), *Alfred*
 Agriculture. *M.S. in Agr.*
 [Horticulture, Landscape Gardening.]
 Committee: Craig, Fleming.
- Lockhart, Oliver Cary, A.B. (Indiana Univ.), 1903, A.M. (same),
 1905, *Albany, Ind.*
 History and Political Science. *Ph.D.*
 [Economics and Finance, Economics and Politics, Modern
 European History.]
 Committee: Fetter, Jenks, Catterall.
- McClain, Grace Darling, Ph.B. (Scio Coll.), 1900, *Cadiz, O.*
 Mathematics. *A.M.*
 Committee: Wait.
- McCourt, Walter Edward, A.B., 1904, A.M., 1905, *Brooklyn*
 Geology. *Ph.D.*
 [Economic Geology, Mineralogy and Petrography, Physical
 Geography.]
 Committee: Ries, Gill, Tarr.

- MacGill, Caroline Elizabeth, A.B., 1904, *Quebec, P. Q., Can*
 History and Political Science. *Ph.D.*
 [American History, Economics and Statistics, Economics and
 Politics.]
 Committee: Farrand, Willcox, Jenks.
- † McNair, Frederick Henry, D.V.M., 1905, *Mt. Morris*
 Materia Medica, Surgery.
- Committee: Fish, Williams.
- McNitt, Robert J, A.B., 1902, M.E., 1904, *Ithaca*
 Electrical Engineering. *M.M.E.*
 Committee: Norris, Karapetoff.
- McNown, William Coleman, B.S.C.E. (Univ. of Wisconsin), 1903, *Manston, Wis.*
 Civil Engineering *M.C.E.*
 [Reinforced Concrete Construction, Mechanics.]
 Committee: Church, Jacoby.
- Mann, Albert Russell, B.S.A., 1905, *Pittsburg, Pa.*
 Agriculture. *M.S. in Agr.*
 [Rural Economy, Animal Breeding.]
 Committee: Wing, Bailey.
- Martin, Charles Knox, B.S. in E.E. (Univ. of Missouri), 1905, *Doniphan, Mo.*
 Mechanical and Electrical Engineering. *M.M.E.*
 Committee: Smith, Norris, Carpenter.
- Martin, Mattie Alexander, A.B., 1902, *Dublin, Va.*
 Philosophy. *A.M.*
 [Logic and Metaphysics, Ethics.]
 Committee: Creighton, Hammond, Albee.
- Martin, William Franklin, B.S. (Univ. of Texas), 1903, C.E. (same), *Attoyac, Texas*
 1904, *M.C.E.*
 Civil Engineering, Mechanics.
 [Hydraulics, Mechanics.]
 Committee: Crandall, Church, Schoder.
- Mathers, Frank Curry, A.B. (Indiana Univ.), 1903, A.M. (same), *Bloomington, Ind.*
 1905, *Ph.D.*
 Chemistry.
 [Inorganic Chemistry, Physical Chemistry, Electro-Chemistry]
 Committee: Dennis, Bancroft.
- Mehling, Mortimer Francis, A.B., 1905, *Cleveland, O.*
 Chemistry. *Ph.D.*
 [Organic Chemistry, Analytical Chemistry, Physical Chemistry.]
 Committee: Orudorff, Dennis, Bancroft.
- † Mills, Frederic Alden, A.B., 1904, *Ithaca*
 Psychology, Greek, Mediæval History.
 Committee: Titchener, Bristol, Burr.

- Mitchell, Frank Davis, A.B., 1904, *Ithaca*
 Philosophy. *Ph.D.*
 [Logic and Metaphysics, Ethics, Psychology.]
 Committee: Creighton, Hammond, Titchener.
- Mitchell, Lynn Boal, B.A. (Ohio State Univ.), 1903, *Piqua, O.*
 Latin, Greek, Ancient History. *Ph.D.*
 Committee: Bennett, Sterrett, Sill.
- **Moffett, Edna Virginia, A.B. (Vassar), 1897, A.M. (Cornell Univ.),
 1901, *Richmond, Va.*
 History and Political Science. *Ph.D.*
 [Mediæval History, Political Science, American History.]
 Committee: Burr, Jenks, Farrand.
- Molby, Fred A, A.B., (Baker Univ.), 1904, *Baldwin, Kan.*
 Physics, Mathematics. *Ph.D.*
 [Experimental and Theoretical Physics, Mathematics.]
 Committee: Nichols, Merritt, Wait.
- Molloy, Mary Aloysia, Ph.B. (Ohio State Univ.), 1903, A.M. (same),
 1905, *Sandusky, O.*
 English, History. *Ph.D.*
 [English Philology, English History, English Literature.]
 Committee: Hart, Catterall, Northup.
- **Morris, Richard, B.S., (Rutgers), 1899, M.S. (same), 1902,
New Brunswick, N. J.
 Mathematics, Physics. *Ph.D.*
 [Pure Mathematics, Applied Mathematics, Theoretical Physics.]
 Committee: Wait, McMahon, Merritt.
- Murray, Elsie, A.B., 1904, *Athens, Pa.*
 Philosophy, Physiology. *Ph.D.*
 [Psychology, History of Philosophy, Physiology.]
 Committee: Titchener, Creighton, Hammond.
- †Nelson, James Allen, Ph.B. (Kenyon Coll.), 1898, Ph.D. (Univ. of
 Penn.), 1903, *Ithaca*
 Honorary Fellow in Entomology.
- Nutt, Harry Garfield, B.S. (Dartmouth Coll.), 1904, M.S. (same),
 1905, *Worcester, Mass.*
 History and Political Science. *Ph.D.*
 [Economics and Statistics, Economics and Politics, Economics and
 Finance.]
 Committee: Willcox, Jenks, Fetter.
- Olmstead, Albert Ten Eyck, A.B., 1902, A.M., 1903, *Troy*
 History and Political Science. *Ph.D.*
 [Oriental History, Classical History, Mediæval History.]
 Committee: Schmidt, Sill, Burr.

Otis, Margaret, A.B., 1893, *Rochester*
Greek, Latin, Comparative Philology. *Ph.D.*

Committee: Sterrett, Bennett.

†Packard, Roscoe Milliken, A.B. (Adelbert Coll.), 1899, A.M. (same),
1900, *Washington, D. C.*

Civil Engineering.

[Hydraulics, Structures.]

Committee: Crandall, Church, Jacoby.

†Paull, Leslie Fairbanks, B.P. (Brown Univ.), 1897, A.M. (same),
1898, *Somerset, Mass.*

Agriculture, Botany.

[Horticulture, Agronomy, Soils, Botany.]

Committee: Craig, Hunt, Atkinson, Fippin.

Pawling, Jesse Randolph, A.B., 1905, *Watertown*
Physiology, Histology. *A.M.*

Committee: Kingsbury, Gage.

Pierce, Clarence Albert, B.S. (Wesleyan Univ.), 1902, M.S. (same),
1904, *Roxbury, Conn.*

Physics.

Ph.D.

[Experimental Physics, Theoretical Physics, Mathematical Physics.]

Committee: Nichols, Bedell, Merritt.

Poindexter, Charles Cardoza, B.S. in Agr. (Ohio State Univ.), 1903,
Parkersburg, W. Va.

Agriculture.

M.S. in Agr.

[Agronomy, Nature Study.]

Committee: Hunt, Bailey.

Rather, Ethel Zirley, A.B. (Univ. of Texas), 1902, A.M. (same), 1903,
Gonzales, Texas

History and Political Science, Romance Languages. *Ph.D.*

[American History, Mediæval History, Spanish,]

Committee: Farrand, Burr, Crane.

Ray, Burton Justice, A.B. (Wake Forest Coll.), 1904, *Raleigh, N. C.*
Chemistry. *Ph.D.*

[Organic Chemistry, Physiological Chemistry, Physical Chemistry.]

Committee: Orndorff, Dennis, Bancroft.

**Ray, Perley Orman, A.B. (Univ. of Vermont), 1898, A.M. (same),
1902, *Burlington, Vt.*

History and Political Science.

Ph.D.

[American History, English Constitutional History, Mediæval
History.]

Committee: Hull, Catterall, Burr.

Read, Effie Alberta, A.B., 1903, *Haverhill, Mass.*

Histology and Embryology, Entomology.

A.M.

Committee: Gage, Comstock.

- Reddick, Donald, A. B. (Wabash Coll.), 1905, *Noblesville, Ind.*
 Botany, Entomology. *Ph.D.*
 [Botany (Mycology), Botany (Physiology), Entomology.]
 Committee: Rowlee, Comstock.
- Reinecke, Leopold, A. B. (Univ. of Cape of Good Hope), 1902, *Languedoc, Cape Colony*
 Geology. *Ph.D.*
 [Stratigraphical Geology, Paleontology, Mineralogy.]
 Committee: Harris, Gill.
- Renner, Roland Borman, B. S. (Purdue Univ.), 1902, M. E. (Cornell), *Nashville, Tenn.*
 1904, Mechanical Engineering. *M.M.E.*
 [Experimental Engineering, Machine Design.]
 Committee: Carpenter, Kimball.
- Rice, George Whitmore, M. E., 1903, *Ithaca*
 Mechanical Engineering. *M.M.E.*
 [Mechanical and Experimental Engineering.]
 Committee: Smith, Carpenter.
- †Richter, Martin Luther, Jr., B. S. in C. E. (Univ. of Ga.), 1904, *Madison, Ga.*
 Electrical Engineering, Physics.
 Committee: Smith, Norris, Nichols.
- Riegel, Ross Milton, C. E., 1904, *Harrisburg, Pa.*
 Civil and Mechanical Engineering. *M.C.E.*
 [Applied Mechanics, Experimental Engineering.]
 Committee: Crandall, Church, Carpenter.
- Robertson, George C, A. B., 1905, *Buffalo*
 Chemistry, Agriculture. *A.M.*
 [Sanitary Chemistry, Dairy Industry.]
 Committee: Chamot, Pearson.
- Robinson, Louis Newton, A. B. (Swarthmore Coll.), 1905, *Vosburg, Pa.*
 History and Political Science. *Ph.D.*
 [Economics and Politics, Economics and Finance, Philosophy.]
 Committee: Jenks, Fetter, Creighton.
- Robinson, Samuel Egbert, B. S. in Agr. (Washington Univ.), 1905, *Walla Walla, Wash.*
 Agriculture. *M.S. in Agr.*
 [Agronomy, Horticulture.]
 Committee: Hunt, Craig.
- Rodgers, Ralph Chapman, M. E., 1905, *Binghamton*
 Physics. *A.M.*
 [Experimental Physics, Theory of Light, etc.]
 Committee: Nichols, Shearer.

- Rogers, Clarence Arthur, B.S.A., 1904, *Bergen*
 Agriculture. *M.S. in Agr.*
 [Horticulture, Poultry.]
 Committee : Craig, Rice.
- Rogers, William Woolard, A.B., 1905, *New York City*
 History and Political Science. *A.M.*
 [Ancient History, Modern European History.]
 Committee : Sill, Catterall.
- Sabine, George Holland, A.B., 1903, *Dayton, O.*
 Philosophy. *Ph.D.*
 [Logic and Metaphysics, Psychology, Ethics]
 Committee : Creighton, Hammond, Titchener, Albee.
- Sawdon, Will M, B.S. in M.E. (Purdue Univ.), 1898, *Aurora, Ind.*
 Mechanical Engineering. *M.M.E.*
 [Mechanical Engineering of Power Plants, Steam Engines and other
 Prime Motors.]
 Committee : Smith, Carpenter.
- †Sayward, Mary Edith, A.B. Smith Coll.), 1894, *Springvale, Me.*
 Botany, Zoology, Physiology.
 Committee : Atkinson, Comstock.
- Schluederberg, Carl George, M.E., 1902, *Pittsburg, Pa.*
 Chemistry, Physics. *Ph.D.*
 [Electro-Chemistry, Physics, Inorganic Chemistry.]
 Committee : Bancroft, Nichols, Dennis.
- Schmitz, Nathaniel, B.S. in Agr (Kansas State Agr. Coll.), 1904, *Sterling, Kan.*
 Agriculture, Botany. *Ph.D.*
 [Root Nodules of Legumes, Study in Cereals, Botany (Physiology).]
 Committee : Hunt, Atkinson.
- Seaton, Sara, A.B. (Wellesley Coll.), 1896, *Cleveland, O.*
 Botany. *A.M.*
 [Botany (Morphology and Embryology, Mycology).]
 Committee : Atkinson, Rowlee.
- Shanks, Lewis Edward Piaget, Ph.B., 1899, A.M. (Columbia Univ.),
 1904, *Ithaca*
 Romance Languages, History and Political Science. *Ph.D.*
 [French, Italian, Mediæval History.]
 Committee : Crane, Burr, Olmsted.
- Sharpe, Francis Robert, A.B., (Cambridge Univ.), 1892, *Ithaca*
 Mathematics. *Ph.D.*
 [Applied Mathematics, Pure Mathematics.]
 Committee : McMahon, Snyder.
- †Sheldon, Helen Griswold, A.B. (Vassar Coll.), 1891, *Ithaca*
 Entomology, Botany, Vertebrate Zoology.
 Committee : Comstock, Atkinson, Wilder.

- Sheldon, Ralph Edward, A.B., 1904, A.M., 1905, *Ithaca*
 Neurology, Histology, Comparative Anatomy. *Ph.D.*
 Committee: Wilder, Gage, Kingsbury.
- Shipman, Robert Lee, B.E. (Univ. of Missouri), 1895, E.E. (same),
 1896, M.E. (Cornell Univ.), 1899, M.M.E. (same), 1904, *Ithaca*
 Physics, Mathematics, *Ph.D.*
 [Applied and Theoretical Physics, Mathematics.]
 Committee: Nichols, Wait.
- Shreve, Richmond Harold, B.Arch., 1902, *Ithaca*
 Architecture, Civil Engineering. *M.S. in Arch.*
 [Steel-Concrete Beams, Foundations.]
 Committee: Martin, Jacoby.
- Sil, Surendra Nath, A.B. (Calcutta Univ.), 1902, *Calcutta, India*
 Agriculture. *M.S. in Agr.*
 [Agronomy, Botany (Mycology).]
 Committee: Hunt, Atkinson.
- **Sisam, Charles Herschel, A.B., (Univ. of Mich.), 1902, A.M., (Cor-
 nell Univ.), 1903, *Sloan, Iowa*
 Mathematics, Physics. *Ph.D.*
 [Pure Mathematics, Applied Mathematics, Physics.]
 Committee: Snyder, McMahon, Merritt.
- *Smith, Gertrude, A.B. (Vassar Coll.), 1897, A.M. (same),
Portland, Me.
 Mathematics, Civil Engineering. *Ph.D.*
 [Pure Mathematics, Applied Mathematics, Mechanics.]
 Committee: Wait, Church.
- Smith, Huron Herbert, B.S. (De Pauw Univ.), 1905, *Winchester, Ind.*
 Botany, Physiology. *Ph.D.*
 [Botany (Systematic), Pharmacology, Botany (Mycology).]
 Committee: Rowlee, Atkinson, Kingsbury.
- †Smith, Julius André, B.S. in Arch., 1902, M.S. in Arch., 1903,
New York City
 Fellow in Architecture.
 Committee: Martin, Prévort.
- Snowdon, Ralph Cuthbert, A.B., 1904, *Scranton, Pa.*
 Chemistry. *A.M.*
 [Electro Chemistry, Inorganic Chemistry.]
 Committee: Bancroft, Dennis.
- Spencer, George Lawton, M.E. (Brown Univ.), 1904, *Providence, R. I.*
 Mechanical Engineering. *M.M.E.*
 [Naval Architecture, Marine Engineering.]
 Committee: McDermott, Thomas.
- †Stacy, Marvin Hendrix, Ph.B. (Univ. of N. C.), 1902, A.M. (same),
 1904, *Waxhaw, N. C.*
 Civil Engineering.
 Committee: Church, McCaustland.

**Stewart, Fred Carlton, B.S. (Iowa Agr. Coll.), 1892, M.S. (same),
1894, *Geneva*
Botany. *Ph.D.*

[Botany (Mycology, Physiology, Histology.)]

Committee: Atkinson, Rowlee.

Stone, Isabelle, A. B. (Wellesley Coll.), 1905, *Needham, Mass.*
[Greek, Comparative Philology.] *A.M.*

Committee: Sterrett, Bristol.

Swaine, James Malcolm, B.S. in Agr., 1905, *Truro, Nova Scotia*
[Economic Entomology, Systematic Vert. Zoology.] *M.S. in Agr.*

Committee: Comstock, Wilder.

Tan, Tien Chih, B.S. (Tientsin Univ.), 1899, B.S. (Univ. of Califor-
nia), 1904, *Canton, China*
Agriculture. *M.S. in Agr.*

[Agricultural Chemistry, Agronomy.]

Committee: Hunt, Cavanaugh.

Taylor, Albert Davis, B.S. (Mass. Agr. Coll.), 1905, *Westford, Mass.*
Agriculture, Botany. *M.S. in Agr.*

[Horticulture, Botany (Systematic).]

Committee: Craig, Rowlee.

Thoroughgood, Robert William, C E. (Lehigh Univ.), 1902,
Georgetown, Del.
[Municipal Engineering and Sewage Disposal, Mining or Masonry
and Foundations.] *M.C.E.*

Committee: Crandall, Ogden, Jacoby, McCaustland.

Turrentine, John William, Ph B. (Univ. of N. C.), 1901, M.S. (same),
1902, *Burlington, N. C.*
Chemistry. *Ph.D.*

[Inorganic Chemistry, Electro-Chemistry, Organic Chemistry.]

Committee: Dennis, Bancroft, Orndorff.

Tuttle, Elbert B, B.S. in E. E. (Iowa State Coll), 1899, *Ames, Ia.*
Physics, Mathematics. *Ph.D.*

[Experimental Physics, Theoretical Physics, Mathematics.]

Committee: Nichols, Merritt, McMahon.

**Van Hook, James M, A.B. (Indiana Univ.), 1899, A.M. (same),
1900, *Borden, Ind.*
Botany. *Ph.D.*

[Botany (Mycology, Comparative Morphology and Embryology,
Physiology.)]

Committee: Atkinson, Rowlee.

Waggoner, Chauncey William, B S, in E. E. (Ohio Univ.), 1904, A.M.
1905, *Sugar Grove, O.*

Physics.

Ph.D.

[Experimental Physics, Theoretical Physics, Electricity and
Magnetism.]

Committee: Nichols, Shearer, Bedell.

- Walbridge, Mabel Harriet, A.B. (McGill Univ.), 1897,
Mystic, P. Q., Can.
 Physics, Mathematics. *A.M.*
 Committee : Nichols, Wait.
- Watkins, George Pendleton, A.B., 1899, *King Ferry*
 History and Political Science. *Ph.D.*
 [Political Economy, Statistics, Politics.]
 Committee : Willcox, Jenks, Fetter.
- Waugb, Robert Benjamin, A.B. (Hobart Coll.), 1902, *Phelps*
 Philosophy. *Ph.D.*
 [Metaphysics and Logic, Ethics, Greek Philosophy.]
 Committee : Creighton, Albee, Hammond.
- Weed, Alfred Cleveland, A.B., 1905, *North Rose*
 [Systematic Vertebrate Zoology, Comparative Anatomy.] *A.M.*
 Committee : Wilder, Comstock.
- West, Mary Cheves, B.S. (Teachers' Coll.), 1902, *Farmville, Va.*
 Philosophy. *Ph.D.*
 [Philosophy, Psychology, Ethics.]
 Committee : Creighton, Hammond, Albee, Titchener.
- **Whetzel Herbert Hice, A.B. (Wabash College), 1902, *Arilla, Ind.*
 Botany. *Ph.D.*
 [Botany (Mycology), Botany (Systematic), Botany (Physiology).]
 Committee : Atkinson, Rowlee.
- Wheeler, John, M.E., 1903, *Ithaca*
 Mechanical Engineering, Experimental Engineering. *M.M.E.*
 Committee : Smith, Carpenter.
- White, Paul J, A.B. (Southwest Kansas Coll.), 1900, A.M. (Univ. of
 Oklahoma), 1901, *Norman, Okla.*
 Agriculture. *M.S. in Agr.*
 [Agronomy, Horticulture.]
 Committee : Hunt, Craig.
- White, Gorrell Robert, A.B., 1905, *Auburn*
 Chemistry. *A.M.*
 [Electro Chemistry, Inorganic Chemistry.]
 Committee : Bancroft, Dennis.
- †Whiting, Rex Anthony, D.V.M., 1905, *Patchin*
 Pathology, Veterinary Sanitary Science, Anatomy.
 Committee : Law, Hopkins, Moore.
- Whittlesey, Walter Lincoln, A.B. (Univ. of Oregon), 1901, *Portland, Ore.*
 History and Political Science. *Ph.D.*
 [Economics and Politics, Economics and Finance, Modern
 European History.]
 Committee : Jenks, Fetter, Catterall.

Wick, Frances Gertrude, A.B., 1905, *Butler, Penn.*
Physics. *A.M.*

[Experimental Physics, Theoretical Physics.]

Committee: Nichols, Shearer.

Wilson, Charles Scoon, A.B., 1904, M.S. in Agr., 1905, *Hall's Corners*
Agriculture. *Ph.D.*

[Horticulture, Agronomy.]

Committee: Bailey, Craig, Hunt.

Wold, Peter Irving, B.S. (Univ. of Oregon), 1901, E.E. (same), 1901, *Eugene, Ore.*
Physics. *A.M.*

[Experimental Physics, Theoretical Physics.]

Committee: Nichols, Shearer.

Worthen, Edmund Louis, B.S. (Univ. of Illinois), 1904, *Warsaw, Ill.*
Agriculture. *M.S. in Agr.*
[Soils, Farm Crops.]

Committee: Hunt, Fippin.

Wright, Albert Hazen, A.B., 1904, A.M., 1905, *Hilton*
Vertebrate Zoology, Comparative Anatomy, Histology. *Ph.D.*

Committee: Wilder, Gage, Kingsbury.

Young, Helen L., A.B., 1900, *East Palmyra*
History and Political Science. *Ph.D.*

[American History, Political Economy and Politics, Modern
European History.]

Committee: Farrand, Jenks.

Zerns, Arthur Burtis, A.B., 1905, *Waterlown*
History and Political Science. *Ph.D.*

[Economics and Politics, Economics and Statistics, American
History.]

Committee: Jenks, Willcox, Farrand.

Graduate Students in Undergraduate Courses.

Abrahams, Morris Landa, B.S. in M.E. (A. & M. Coll. of Texas),
1903, *M.E.*

Aitken, John Winfield, Jr., C.E. (Penn. Mil. Coll.), 1904, *M.E.*

Aleman, Fernando, B.A. (National Agr. Coll.), 1898, *B.S.A.*

Balcke, Walter Henry, A.B. (Ill. Coll.), 1904, *M.E.*

Baltasar, Apolinario, B.S. (Manila), 1903, *C.E.*

Barrows, Franklin William, A.B. (Amherst), 1885, A.M. (same), 1888,
M.D. (Univ. of Buffalo), 1893, *Sp. M.D.*

Bautista, Mariano, B.A. (Ateneo de Manila), 1902, *B.Arch.*

Becker, Neal Dow, I.I.B., 1905, *A.B.*

Beebe, Silas Palmer, B.S. (Harvard), 1900,	<i>M.D.</i>
Berrini, Luiz Carlos, C.E. (Mackenzie Coll.), 1904,	<i>M.E.</i>
Berry, Romeyn, A.B., 1904,	<i>L.L.B.</i>
Bishop, Ernest Simons, A.B. (Brown Univ.), 1899,	<i>M.D.</i>
Bliss, George Ripley, B.A. (Bucknell Univ.), 1903,	<i>M.E.</i>
Bostroem, August, Jr., B.S. (Coll. City of New York), 1903,	<i>M.E.</i>
Boxmeyer, Charles Herbert, A.B. (Stanford Univ.), 1896,	<i>M.D.</i>
Bradley, James Chester, A.B. (Phila. Cent. H. S.), 1903,	<i>A.B.</i>
Brewink, John Edward, Ph.B. (North Western Univ.), 1902,	<i>M.E.</i>
Brown, Stanley Doty, A.B., 1905,	<i>L.L.B.</i>
Burnham, Enoch Lewis, A.B. (Harvard), 1904,	<i>C.E.</i>
Butts, Mary Byrissa, B.A. (Grove City Coll.), 1902,	<i>A.B.</i>
Cahill, Francis Joseph, A.B., 1903,	<i>M.D.</i>
Caldwell, Isabel, A.B., 1904,	<i>M.D.</i>
Canaga, Gordon Byron, B.A. (Scio Coll.), 1902,	<i>C.E.</i>
Carlisle, Lenore Nelson, A.B. (New Windsor Coll.), 1896,	<i>M.D.</i>
Carroll, William Gilbert, B.L. (Baylor Univ.), 1903,	<i>M.E.</i>
Chace, Archibald Eastwood, A.B., 1904,	<i>M.D.</i>
Chamberlain, Frank Wilbut, B.S. (Univ. of Vt.), 1904,	<i>D.V.M.</i>
Chapman, Arthur William, Ph.B. (Wesleyan Univ.), 1903,	<i>M.D.</i>
Child, Frank Samuel, Jr., Ph.B. (Hamilton Coll.), 1903,	<i>M.D.</i>
Chryssides, Starros Stephen, A.B. (Robert Coll.), 1905,	<i>M.E.</i>
Clark, Ellen Stout, B.P. (West Chester Nor.), 1903,	<i>A.B.</i>
Clurman, Morris Joseph, A.B., 1905,	<i>M.D.</i>
Cockrill, Emmet, B.M.E. (Univ. of Ark.), 1905,	<i>M.E.</i>
Coffman, John Daniel, A.B. (Phila. High School), 1900,	<i>A.B.</i>
Colletti, Ignatius, M.D. (Palermo Univ., Italy), 1903,	<i>Sp. M.D.</i>
Collier, Lamar Sheffield, M.E. (Ga. Sch. of Tech.), 1905,	<i>M.E.</i>
Cornell, Florence M, A.B. (New York City Nor. Coll.), 1905,	<i>A.B.</i>
Craig, Ira Lynn, M.Di (Iowa Normal), 1905,	<i>M.E.</i>
Craig, Samuel Daley, A.B. (Hampden Sidney Coll.), 1904,	<i>B.Arch.</i>
Craighead, James Ray, B.A. (Williams Coll.), 1895, M.A. (same), 1898,	<i>M.E.</i>
Crawford, Mary Merritt, A.B., 1904,	<i>M.D.</i>
Cross, Ralph Adam, A.B., 1904,	<i>L.L.B.</i>
Cuddeback, Edgar Gordon, A.B., 1904,	<i>M.D.</i>
Cutler, Charles Evelyn, A.B., 1904,	<i>B.Arch.</i>
Davis, Charles Roy, A.B. (Ouachita Coll.), 1904,	<i>M.D.</i>
Davis, Roy Bingham, A.B., 1904,	<i>L.L.B.</i>
Day, Rodney Dean, B.A. (Yale Univ.), 1903,	<i>M.E.</i>
Dennis, Nina A, A.B., 1904,	<i>M.D.</i>
Dewey, Thomas Augustus, B.S. (Va. Mil. Inst.), 1903,	<i>M.E.</i>

- Dodson, Martha Ethel, B.E. (Bloomsburg State Nor.), 1903, *A.B.*
 Donahue, William James Aloysius, A.B. (St. Peter's Coll.), 1904, *M.D.*
 Dragoshinoff, Dragoshin George, A.B. (Robert Coll.), 1904, *B.S.A.*
 Drake, William Allen, B.S. (Purdue Univ.), 1899, *M.E.*
 Dryfuss, Barney Joachim, B.S. (Coll. City of N. Y.), 1899, *M.D.*
 (Univ. of Louisville), 1903, *M.D.*
 Dubuis, John, B.A. (Presbyterian Coll. of S. C.), 1905, *C.E.*
 Estill, George Castleman, A.B. (Kentucky Univ.), 1902, *M.E.*
 Evans, Gordon Maynard, B.S. (Coll. City of New York), 1904, *M.E.*
 Fabbri, Remo, Ph.G. (Phar. Inst. N. Y. City), 1904, *Sp.M.D.*
 Fairlamb, Gertrude May, M.E. (West Chester Normal), 1898, *A.B.*
 Farrior, James William, B.E. (N. C. Coll. of Agr. & Mech. Arts),
 1904, *M.E.*
 Felknor, James Minnis, A.B. (Maryville Coll.), 1905, *C.E.*
 Fendrich, William, Jr., B.S. (Coll. City of New York), 1904, *M.E.*
 Fenno, George Francis, B.S. (Coll. City of New York), 1903, *M.E.*
 Fernow, Bernard Edward, Jr., A.B., 1904, *M.E.*
 Fisher, Mary Jones, A.B. (Western Maryland Coll.), 1890, *A.B.*
 Fleming, Bryant Percival, B.S. (Utah Agr. Coll.), 1900, *C.E.*
 Fraser, Nora Blanding, A.B. (Mary Baldwin Sem.), 1901, *A.B.*
 Frey, Harry Charles, A.B., 1904, *L.L.B.*
 Freyre, Leopoldo Estanislao, A.B. (Univ. of Havana), 1903, *C.E.*
 Frost, Harry Barber, B.S. (Univ. of No. Car.), 1904, *M.E.*
 Fryer, Harry Lee, B.S. (Oregon Agr. Coll.), 1905, *M.E.*
 Gaby, Robert Edward, B.A. (Toronto Univ.), 1903, *M.D.*
 Galadjikian, Alexander Sarkis, A.B. (Robert Coll.), 1904, *M.E.*
 Garrow, Theodore Alexander, B.S. (Ore. Agr. Coll.), 1905, *M.E.*
 Gehr, Ray Stewart, Ph.B. (Adelbert Coll.), 1899, *M.E.*
 Gelser, George Merrill, A.B. (Yale), 1904, *M.D.*
 George, Emma Louise, Ped.B. (Albany Nor. Coll.), 1897, *Sp.A.B.*
 Gilchrist, Jessie Lewis, M.P. (Bloomsburg Nor.), 1898, *A.B.*
 Ginorio, Francisco Ricardo, A.B. (Inst. de Puerto Rico), 1899, *M.E.*
 Gomez, José Antonio, Ph.B. (Vicente Rocafuerte Coll.), 1904, *C.E.*
 Goodall, Edwin Baker, M.D. (Maryland Med. Coll.), 1905, *Sp.M.D.*
 Gordon, Thomas Croxton, B.D. (Va. Mil. Inst.), 1904, *M.E.*
 Graves, Gaylord Willis, A.B., 1905, *M.D.*
 Greenberg, Max, A.B., 1905, *M.E.*
 Gregg, Robert, B.S. in M.E. (Ga. Sch. of Technology), 1905, *M.E.*
 Gregson, Edward Jesse, B.A. (Univ. of Sydney), 1903, *M.E.*
 Grove, Elmer Emanuel, A.B. (Randolph-Macon Coll.), 1903, *A.M.*
 (same), 1904, *M.E.*

- Haines, Charles Alvin, A.B. (Muhlenberg Coll.), 1904, *M.E.*
Harris, Eugene Augustus, A.B. (Southwestern Univ. of Tex.), 1888,
M.D. (same), 1891, *Sp.M.D.*
Hart, Harold Leslie, A.B., 1903, *L.L.B.*
Hartnett, Micheal Arnold, B.S. (So. Car. Mil. Acad.), 1904, *M.E.*
Hascall, Theodore Conrad, Ph.B. (Brown Univ.), 1905, *M.D.*
Hatfield, Hazel May, A.B., 1905, *M.D.*
Hocson, Felix, B.A. (Manila), 1902, *Sp. B.S.A.*
Horn, Stanley Granger, A.B., 1905, *M.D.*
Irvine, Pierpont Edward, A.B. (Kenyon Coll.), 1904, *M.E.*
Johnson, Howard White, B.S. (Northwestern Univ.), 1904, *M.E.*
Johnston, James Markham Ambler, B.S. (Va Poly. Inst), 1904, *M.E.*
(same), 1905, *M.E.*
Jones, George Francis, A.B. (Biddle Univ.), 1901, *Sp. B.S.A.*
Joshi, Lemuel Lucas, B.Sc. (Univ. of Bombay), 1902, *M.D.*
Kearns, Thomas Joseph, B.A. (Manhattan Coll.), 1902, *M.D.*
Kenajian, Hagop, B.S., C.E. (Ohio Northern Univ.), 1905, *Sp.C.E.*
Kernan, Nicholas Edward, A.B. (Georgetown), 1903, *L.L.B.*
King, Alfred Faris, B.S. (Princeton), 1905, *M.E.*
Koehler, Charles George, Jr., A.B., 1904, *M.D.*
Krass, Ralph William, B.S. (Coll. City of N. Y.), 1903, *M.E.*
Kronberg, Sol, A.B. (Coll. City of N. Y.), 1903, *C.E.*
Laase, Christian F J, B.S. (Coll. City of N. Y.), 1899, M.D. (New
York Univ.), 1894, *Sp. M.D.*
Laird, Ida Marie, A.B., 1904, *M.D.*
Lewis, Ora Mabelle, A.B. (Smith Coll.), 1900, *M.D.*
Lodge, Richard Leslie, C.E. (Univ. of Ala.), 1904, *Sp.C.E.*
London, Julius, M.D., 1905, *Sp. M.D.*
Louis, Henry Charles Ernest, A.B. (Johns Hopkins), 1904, *M.E.*
Lyon, Charles Albert, A.B. (Princeton), 1901, *M.E.*
McCollum, Eugene Lawrence, L.L.B., 1905, *Sp.A.B.*
McCombs, Carl Esselstyn, A.B. (Union Coll.), 1904, *M.D.*
McGlone, John, A.B. (Johns Hopkins), 1904, *M.E.*
McIver, George Walter, B.S. (Clemson Coll.), 1904, *M.E.*
McKay, Florence Lurinda, A.B., 1905, *M.D.*
McKelvey, Joseph Vance, B.A. (Westminster Coll.), 1902, *A.B.*
Maloney, Edgar William, B.A. (St. Lawrence Univ.), 1905, *C.E.*
Mann, Charles Maitland, A.B., 1904, *M.D.*
Mannoccir, James Earle, B.A. (Spring Hill Coll.), 1904, *M.E.*
Mausfield, Edward Raymond, B.S. (Univ. of Me.), 1899, *M.D.*
Martin, Arthur Harold, A.B., 1904, *M.D.*
Martinez, Carlos, B.S. in Nat. Sci. (Univ. of Arequipa, Peru),
1903, *M.E.*

Mason, William Henry, B.Sc. (Sydney Univ.), 1905,	<i>M.E.</i>
Matthews, Hubert Willard, B.S. (Clemson Coll.), 1904,	<i>M.E.</i>
Matty, Frank Joseph, C.E. (Penna. Mil. Coll.), 1905,	<i>M.E.</i>
Mitchell, James Reid, Jr., A.B., 1905,	<i>M.D.</i>
Mitchell, Walter R, M.E. (Md. Agr. Coll.), 1904,	<i>M.E.</i>
Moore, Kingman Colquitt, B.S. (Mercer Univ.), 1897,	<i>Sp.B.S.A.</i>
Moore, Merrill Bruce, B.S. (Ore. Agr. Coll.), 1905,	<i>M.E.</i>
Moorman, Silas Mercer, A.B. (Georgetown Coll.), 1898,	<i>M.D.</i>
Morgan, William Conant, B.S. (Amherst Coll.), 1903,	<i>M.E.</i>
Morrow, Homer Nichols, A.B. (Southwestern Presbyterian Univ.), 1904,	<i>M.E.</i>
Mortimer, Charles Ward, B.S. (Miss. College), 1902,	<i>M.E.</i>
Mowat, John Frederic, A.B., 1904,	<i>M.E.</i>
Muenz, Sigmund, B.S. (Coll. City of New York), 1901,	<i>C.E.</i>
Nelbach, George Joseph, A.B., 1905,	<i>LL.B.</i>
Newcomb, Robert Scott, B.S. (Univ. of Ga.), 1905,	<i>M.E.</i>
Oberndorf, Clarence Paul, A.B., 1904,	<i>M.D.</i>
Olds, Thomas Hartman, B.S. (A. & M. Coll. of Texas), 1902,	<i>C.E.</i>
Oliver, Clifford Rylander, A.B. (Univ. of Ga.), 1904,	<i>M.E.</i>
O'Neill, Charles Leo, A.B. (Seton Hall Coll.), 1904,	<i>M.D.</i>
Parker, Esther Emily, A.B., 1905,	<i>M.D.</i>
Patterson, Lucius Lamar, A.B. (Miss. Coll.), 1898, A.M. (same), 1899,	<i>M.E.</i>
Patton, William Fearn, Jr., A.B., (Hampton Sidney Coll.) 1903,	<i>M.E.</i>
Payne, Charles Rockwell, A.B., 1902,	<i>M.D.</i>
Payne, Edward Duggan, C.E. (Princeton), 1905,	<i>M.E.</i>
Pease, George Norman, A.B., 1904,	<i>M.D.</i>
Perry, Leslie Donald, A.B., 1905,	<i>M.E.</i>
Petit, Charles Wesley, B.S. (Univ. of Calif.), 1903,	<i>Sp.C.E.</i>
Phelan, James, A.B. (Princeton Univ.), 1905,	<i>M.E.</i>
Pierce, Paul Leon, B.S. (Chattanooga Nor. Univ.), 1901,	<i>C.E.</i>
Ponce de Leon, Felipe, A.B. (Habana Inst.), 1900,	<i>C.E.</i>
Porter, Floyd John, B.S.A., 1905,	<i>A.B.</i>
Porterie, Gaston Louis, B.S. (La. State Univ.), 1904,	<i>C.E.</i>
Price, Daniel J, M.D. (Baltimore Med. Coll.), 1902,	<i>Sp.M.D.</i>
Quarles, Tev Randolph, B.M.E. (Univ. of Ark.), 1904,	<i>M.E.</i>
Quisumbing, Emilio, B.A., (Manila), 1900,	<i>C.E.</i>
Ray, Anna Elizabeth, A.B. (Normal Coll. New York), 1899, A.M. (New York Univ.), 1902,	<i>M.D.</i>
Reed, Lucy Carleton, A.B., 1904,	<i>M.D.</i>
Reyes, José, A.B. (Ateneo de Manila), 1904,	<i>B.Arch.</i>
Richardson, Frank Howard, A.B., 1904,	<i>M.D.</i>

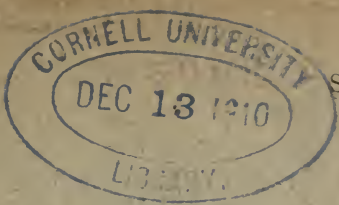
- Richter, Martin Luther, Jr., B.S. in C.E. (Univ. of Ga.), 1904, *M.E.*
 Robertson, Ralph Kenyon, A.B., 1904, *L.L.B.*
 Robinson, Charles Albert, Jr., A.B. (Johns Hopkins), 1903, *M.E.*
 Roman, Julius Caesar, B.S. (West Inst. of Granada, Nicaragua),
 1894, *M.D.*
 Rossman, Allen M, A.B., 1905, *M.E.*
 Roudebush, Roy Everett, A.B. (Indiana Univ.), 1903, *M.E.*
 Rulison, Elbert Theodore, Jr., B.S. (Union Coll.), 1904, *M.D.*
 Ryan, Walter J, A.B. (Oberlin), 1903, *C.E.*
 Sackman, Gilbert Roy, B.S. (Coll. City of New York), 1905, *M.E.*
 Sampaio, Vincente de Almeida, B.S. (Mackenzie Coll.), 1903. *M.E.*
 Santee, Harold Elmore, A.B., 1904, *M.D.*
 Saulsbury, Henry Wilson, A.B. (Western Md. Coll.), 1902, *M.E.*
 Scales, Henry Jackson, B.S. in E.E. (Ga. Sch. of Tech.), 1904, B.S.
 in M.E. (same), 1905, *M.E.*
 Scheidenhelm, Fred William, A.B., 1905, *C.E.*
 Schmid, Robert Major, B.S. (Coll. City of New York), 1902, *M.E.*
 Scholtz, Herman Fred, B.C.E. (Ky. State Coll.), 1905, *C.E.*
 Schutz, Harry Herman, B.S. (New Mex. Coll. of Agr.), 1905, *B.S.A.*
 Schwartz, Leo Samson, Ph.G. (New York Coll. of Pharmacy), 1901,
M.D.
 Schwartz, Samuel Robert, A.B. (Coll. City of New York), 1903, *M.E.*
 Shane, Bernard, B.S. (Coll. City of New York), 1902. *C.E.*
 Simonton, Ira Boyce, B.S. (Univ. of Fla.), 1903, *M.E.*
 Smith, Jay Lewis, A.B., 1904, *M.E.*
 Specht, William Henry, D.D.S. (New York C. D.), 1902, *M.D.*
 Strehan, George Earnest, B.S. (Coll. City of New York), 1904, *M.E.*
 Summer, Wilhelm Carl, A.B. (Clemson), 1902, *M.E.*
 Sweet, Earl Vincent, A.B. (Colgate), 1901, *M.D.*
 Swisher, Donald De Witt, A.B. (Univ. of Tenn.), 1903, *B.Arch.*
 Tappan, Frank Girard, A.B. (Washington & Jeff.), 1904, *M.E.*
 Tenney, Albert Seward, A.B., 1905, *M.D.*
 Thro, William Crooks, B.S.A., 1900, A.M., 1901, *M.D.*
 Tibbetts, Harland Bryant, A.B., 1904, *L.L.B.*
 Tiffany, Dean Stanley, B.S. (Keuka Coll.), 1905. *B.S.A.*
 Tinkler, John, Jr., A.B., 1905, *M.D.*
 Turner, William Joel, B.A. (Wash. & Lee Univ.), 1903, *C.E.*
 Vaughn, Eva Gertrude, A.B. (Converse Coll.), 1905, *A.B.*
 Vaughlin, Leland Alexander, B.L. (Kenyon Coll.), 1904, *M.E.*
 Veazey, John Armor, A.B. (Westminster Coll.), 1902, *A.B.*
 Wade, Henry Albert, M.D. (New York Univ.), 1894, *Sp. M.D.*
 Walker, William Joseph, A.B. (Coll. City of New York), 1904, *M.D.*

- Wallower, Edgar Zollinger, C.E. (Princeton) 1905, *M.E.*
 Wanless, Richard, D.O., (Am. Sch. of Osteopathy), 1900, *M.D.*
 Waterhouse, Ernest Comston, A.B. (Princeton), M.D. (New York
 Coll. of Physicians and Surgeons), 1898, *Sp. M.D.*
 Watkins, Warner Merriwether, B.S. (Va. Poly. Inst.), 1904, *M.E.*
 Way, Cassius, B.Agr. (Conn. Agr. Coll.), 1899, *A.B.*
 Weber, Florenz Pauline, M.E. (Clarion Normal), 1895, *A.B.*
 Weber, Salo, A.B. (Coll. City of New York), 1904, *M.D.*
 Welch, Stewart Henry, A.B. (Southern Univ.), 1902, *M.D.*
 Welles, Edward Murray, A.B., 1905, *M.D.*
 West, Ray Benedict, B.S. (Agr. Coll. of Utah), 1904, *C.E.*
 Westgate, Mary Lanton, B.A. (Wesleyan Univ.), 1897, *B Arch.*
 Wetherill, John Larkin, C.E. (Pa. Mil. Coll.), 1905, *M.E.*
 Wheeler, Earl, B.S. in E.E. (Kansas State Agr. Coll.), 1905,
Sp. M.E.
 White, Gersham Franklin, B.S. (Ohio Univ.), 1901, Ph.D. (Cornell),
 1905, *M.D.*
 Williams, Maurice William, B.S. (Colgate Univ.), 1903, *Sp. C.E.*
 Wills, John Gordon, B.S.A. (Univ. of Vermont), 1903, *D.V.M.*
 Wilson, David, A.B., 1905, *M.D.*
 Winans, James Albert, A.B. (Hamilton), 1897, A.M. (same), 1900,
L.L.B.
 Wing, Lucius Arthur, B.Sc. (Ohio State Univ.), 1903, *M.D.*
 Winslow, Elizabeth Bishop, A.B., 1901, *M.D.*
 Wise, Frank Lounsbury, B.A. (Coll. City of New York), 1904, *M.E.*
 Wolheim, Louis Robert, B.S. (Coll. City of New York), 1903, *M.E.*
 Wonderly, George Arthur, Ph. B. (Dickinson Coll.), 1905, *M.E.*
 Wood, Edward Ainsley, C.E. (Univ. of the South), 1905, *C.E.*
 Wood, Frank Travers, B.S. (Va. Mil. Inst.), 1904, *M.E.*
 Woodhull, Stephen Curtis, D O. (Am. Sch. of Osteopathy), 1900,
M.D.
 Wortman, Otto, B.S. (Coll. City of New York), 1903, *M.E.*
 Wright, Thomas Temple, B.A. (Richmond Coll.), 1904, *C.E.*
 Ycasiano-Roxas, Francisco, B.A. (Ateneo de Manila), 1903, *M.E.*
 Yih, Koliang, A.B. (Chinese Univ.), 1902, *B.S.A.*

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APRIL 1910



SERIES 10, No. 6

THE UNIVERSITY RECORDS

CORNELL UNIVERSITY ANNOUNCEMENT OF THE GRADUATE SCHOOL 1910-11

ITHACA, NEW YORK
PUBLISHED BY THE UNIVERSITY

Monthly except February, May, October, and December,
and semi-monthly in February and May

[Entered at the Post Office at Ithaca, N. Y., as second-class matter]

CALENDAR 1910-11.

First Term—1910.

September 30, Friday—Instruction begins. The President's annual address to students at 12:00 M.

October 1, Saturday—Registration Day for students in the Graduate School. 9 A. M.—1 P. M.

October 15, Saturday—Major and minor subjects must be selected, approved by the professors concerned, and announced to the Dean not later than this date.

December 1, Thursday—Those intending to take an advanced degree in June must hand in a statement of the general subject of the thesis to the Dean not later than this date.

December 22, Thursday—The Christmas recess begins.

1911.

January 4, Wednesday—Work resumed.

January 11, —Founders' Day.

February 8, Wednesday—First term closes.

Second Term—1910.

February 13, Monday—Registration day for students in the Graduate School. 9 A.M.—1 P.M.

April 6, Thursday—Spring Recess begins.

April 11, Tuesday—Work resumed.

April 15, Saturday—Those desiring to receive their degree in June must make application not later than this date for examination.

June 22, Thursday—Commencement.

CORNELL UNIVERSITY

ANNOUNCEMENT

OF

THE GRADUATE SCHOOL

1910-11

ITHACA, NEW YORK
PUBLISHED BY THE UNIVERSITY

CORNELL UNIVERSITY
THE GRADUATE SCHOOL

OFFICERS OF ADMINISTRATION

JACOB GOULD SCHURMAN
President

ERNEST MERRITT
Dean

DAVID F. HOY
Registrar

EMMONS L. WILLIAMS
Treasurer

THE GRADUATE SCHOOL

Admission.

The Graduate School has exclusive control of all graduate work done in the University. Graduates of the following Colleges of this University, namely, the College of Arts and Sciences, the Medical College, the College of Architecture, the College of Civil Engineering, the Sibley College of Mechanical Engineering, and the New York State College of Agriculture,—or of other institutions in which the requirements for the first degree are substantially equivalent,—are eligible for admission to the Graduate School. In determining eligibility for admission in other cases, studies pursued after graduation, and experience gained by professional work, or otherwise, are taken into consideration in deciding whether the candidate's preparation, as a whole, is substantially equivalent to that required for a first degree at Cornell University.

Seniors in one of the colleges of Cornell University who have completed the work required for the bachelor's degree may, under certain conditions, to be ascertained from the Dean of the College, be admitted to the Graduate School.

In order to avoid delays at the beginning of the college year, those who desire to enter the School are advised to make application for admission, either in person or by letter, in the preceding spring or summer. Correspondence should be addressed to the Dean of the Graduate School, Cornell University, Ithaca, N. Y.

Before admission it will be necessary to present evidence of the degree already received, i.e., either the diploma or a statement from some official source.*

Registration.

Students who have been admitted to the Graduate School are required to register at the office of the Registrar of the University at the beginning of each term, unless special permission for later registration has been granted by the Dean.

*The simplest procedure will ordinarily be to obtain an official statement from the Registrar or Dean that the degree has been conferred. In the case of graduates of Cornell University this is not necessary, since the records are conveniently accessible.

Studies.

All advanced courses of study offered in the University, and all the facilities for study and investigation afforded by its libraries and laboratories, are open to students in the Graduate School, subject only to the condition of their being qualified by previous study or experience to undertake the particular work desired.

The purpose of the School is to provide the student with the method and discipline of original research, to the ultimate end that he may contribute to the advancement of knowledge. In furnishing this opportunity for independent study and investigation, the School seeks to make the conditions such as will enable the student to devote himself wholly to his chosen field. Unhampered by the restrictions that necessarily obtain in undergraduate work, he will come into freedom of association with older scholars, who will seek to make his work profitable to him by giving such aid and direction as he may need. Inasmuch as subjects differ greatly, the requirements for all subjects cannot be stated in terms at once specific and uniform. In some departments of knowledge original research may begin with the student's entrance into the school, while in other departments much preliminary graduate work is necessary to fit the student for profitable research.

The branch of knowledge to which the student intends to devote the larger part of his time is termed his major subject. The other fields of study selected, which will be necessarily more restricted in their scope, and which should in general be selected with reference to their direct bearing upon the major work, are termed, the minor subjects. A statement of the major and minor subjects, approved by the professors with whom the work is taken, must be presented to the Dean not later than two weeks after admission to the Graduate School.

Special Committees.

The work of each graduate student is in charge of a committee consisting of two or more professors under whom his major and minor subjects are pursued, the professor of his major subject being chairman. The student is expected to confer freely with the members of his special committee, not only in connection with individual courses of study, but also in regard to the general plan of his work.

The Degree of Doctor of Philosophy.

The degree of Doctor of Philosophy is granted to students who, after completing not less than three years of resident graduate work, present a satisfactory thesis and pass an examination.

Examinations for the Doctor's degree will occur during the second week before Commencement, unless another date is set by the Dean. These examinations, which may be either oral or written, or both, at the option of the examining committee, are open to all members of the faculty. Candidates who will have completed the other requirements for the degree in June must apply to the Dean, not later than April 15th, for examination. A list giving the dates of the examinations and the members of the examining committees will be issued early in May.

The thesis for the Doctor's degree must be of such a character as shall demonstrate the candidate's ability to do original work, and must be satisfactory in style and composition. A statement of the general subject of the thesis, with the written approval of the chairman of the special committee in charge of the candidate's work, must be furnished the Dean not later than December 1st of the academic year in which the degree is taken. The completed thesis, approved by the chairman of the special committee, must be presented to the Dean at least five days before the examination for the degree.*

Each candidate for the Doctor's degree must deposit fifty printed copies of his thesis with the Librarian of the University. If the printing of the thesis is deferred until after Commencement the candidate must deposit a bound typewritten copy† with the Dean not later than the Friday preceding Commencement. The diploma for the degree will be withheld until the required number of printed copies has been deposited.

The candidate should consult with the Dean regarding the form of publication of the thesis. The title page must include the statement that the thesis is presented to the Faculty of the Graduate School of Cornell University for the Degree of Doctor of Philosophy. The author's name must be given in full, and, if the thesis is a reprint, the place and date of the original publication must be given.

Not all students admitted to the Graduate School may expect to obtain the Doctor's degree at the end of the minimum period of three years. Those whose undergraduate work has been insufficient in amount, or too narrowly specialized, as well as those whose preparation in their special field is inadequate, must count

*This copy will be returned for use at the examination, or for binding, if desired.

†The size of the page in case of typewritten theses should be 8x10½ inches. This copy of the thesis becomes the permanent property of the Library.

upon spending some time—determinable by their proficiency—in work of a character not as advanced as that implied in the minimum residence requirement. The minimum residence requirement of three years applies only to graduates of a four years' course in some college of this University, and to graduates of other institutions who have pursued a course of study substantially equivalent to that of the College of Arts and Sciences of this University.

Resident graduate study elsewhere may, by permission of the Faculty, be accepted as the equivalent of residence at this University*; but at least one year's residence in this University is required in all cases.

Residence for the Master's degree, may be credited toward the residence required for the degree of Doctor of Philosophy, provided the special committee in charge of the work approve, certifying the work done as suitable for such Doctor's degree.

Graduate work carried on by a candidate who is at the same time an instructor or an assistant is estimated on the basis of a four year's minimum residence.

The Master's Degree.

Cornell University confers the degrees of Master of Arts, Master of Civil Engineering, Master of Mechanical Engineering, Master of Science in Agriculture, and Master of Science in Architecture.

A candidate for the Master's degree must spend at least one year in residence at this University and pursue, under the direction of his special committee, a course of advanced study including one major and one minor subject. He must then present a satisfactory thesis and pass an examination.

Examinations for the Master's degree will occur during the second week before Commencement unless another date is set by the Dean. These examinations, which may be written, or oral, or both, at the option of the examining committee, are open to all members of the faculty.

Candidates who will have completed the other requirements for the degree in June must apply to the Dean, not later than April 15th for examination. A list giving the dates of the examinations and names of the examining committees will be issued early in May.

*No general statement can be made regarding the conditions under which such permission will be granted; each case will be decided on its merits. Requests for credit for resident work elsewhere must be approved by the student's special committee.

The thesis for the Master's degree must be of such a character as to demonstrate the student's ability to do original work, and must be satisfactory in style and composition. A statement of the general subject of the thesis, with the written approval of the chairman of the special committee in charge of the candidate's work, must be furnished the Dean not later than December first of the academic year in which the degree is to be taken. The completed thesis, approved by the chairman of the special committee, must be presented to the Dean at least five days before the examination for the degree*.

Each candidate for the Master's degree is required to furnish a bound typewritten copy of his thesis for the use of the University Library, and this copy is to be delivered to the Dean on or before the Friday preceding Commencement.†

Not all students admitted to the Graduate School may expect to receive the Master's degree in the minimum time of one year. Those whose undergraduate work has been insufficient in amount, as well as those whose preparation in their special field is inadequate, must expect to spend some time in preparatory work. The minimum requirement of one year applies only to students whose preparation at the time of entering the Graduate School is in all respects equivalent to that implied by the corresponding first degree from this University.

FELLOWSHIPS AND GRADUATE SCHOLARSHIPS.

Applications for Fellowships and Graduate Scholarships should contain a full statement of the branches of study which the candidate intends to carry on, if appointed; and if any literary or specific work has been produced which could be put in evidence, specimen copies should accompany the application. Those candidates who are graduates of other colleges or universities should submit recommendations from the instructors best acquainted with their ability and attainments in the special subjects which they desire to pursue. It should be borne in mind by such applicants that information cannot be too exact or detailed in the case of students not personally known to the appointing body.

The Statute in regard to Fellowships and Graduate Scholarships is as follows:

*This copy will be returned for use at the examination or for binding, if desired.

†The size of the page in the case of typewritten thesis should be 8x10 ½ inches. This copy of the thesis becomes the permanent property of the Library.

1. There have been established at this University the following Fellowship and Graduate Scholarships:

(a). Eight University Fellowships, denominated respectively, the Cornell Fellowship; the McGraw Fellowship; the Sage Fellowship; the Schuyler Fellowship; the Sibley Fellowship; the Goldwin Smith Fellowship; the President White Fellowship; and the Erastus Brooks Fellowship.

(b). Five University Fellowships.

The above thirteen University Fellowships have been assigned to the following Departments or groups of Departments: Mathematics, Chemistry, Physics, Civil Engineering, Neurology and Physiology and Vertebrate Zoology, (including Anatomical Methods and Human Anatomy and Microscopy, Histology and Embryology) with Invertebrate Zoology and Entomology, Botany and Geology and Physical Geography, Architecture, Agriculture and Horticulture and Veterinary Science, English, Germanic Languages, Romance Languages, one each; Mechanical and Electrical Engineering, two.

(c). Two President White Fellowships, denominated: first, the President White Fellowship of Modern History; second, the President White Fellowship of Political and Social Science.

(d). Three Susan Linn Sage Fellowships in Philosophy.

(e). Two Fellowships in Political Economy.

(f). Two Fellowships in Greek and Latin.

(g). One Fellowship in American History.

The President White Fellowships in History and in Political and Social Science have an annual value of \$600 each; the others have an annual value of \$500 each.

(h). Six Graduate Scholarships in the Susan Linn Sage School of Philosophy, each of the annual value of \$300.

(i). Ten Graduate Scholarships, each of the annual value of \$300, have been assigned to the following Departments or groups of Departments: Mathematics, Chemistry, Physics, Civil Engineering, Latin and Greek, Archæology and Comparative Philology, Neurology and Physiology and Vertebrate Zoology (including Anatomical Methods and Human Anatomy and Microscopy, Histology and Embryology) with Invertebrate Zoology and Entomology, Botany and Geology and Physical Geography, English, History, one each.

2. All candidates for Fellowships and Graduate Scholarships must be graduates of this University, or of some other institution having equivalent courses of instruction, and must be of high

character and marked ability in some important department of study..

3. Fellows and Graduate Scholars will be selected by the Graduate School on the recommendation of the department in which the applicants desire to carry on the principal part of their work.

4. All applications must be filed with the Dean of the Graduate School on or before the 15th of April of the collegiate year preceding the one for which the application is made. Blank forms for application may be obtained from the Dean.

5. The term of each Fellowship and Graduate Scholarship is one year; but the term may be extended to two years, providing the extensions does not increase the number of Fellows and Graduate Scholars beyond that named in paragraph 1 of this act.

6. The moneys due on Fellowships and Graduate Scholarships are paid at the office of the Treasurer of the University in six equal payments, on October 15, December 1, January 15, February 15, April 1 and May 15.

7. In view of the fact that practical University instruction will be of use in training said Fellows and Scholars for future usefulness, each holder of a Fellowship or Graduate Scholarship shall be liable to render service to the University in the work of instruction or examination to the extent of four hours per week through the collegiate year. The distribution and assignment of this service shall be determined by the head of the department in which the Fellow or Scholar is doing the principal work. It is expected that the President White Fellows in History and Political Science will do a large part of their study in the President White Library, and to this end, it is required that, except when, with the consent of the Librarian of the University, they are excused or assigned to other duties by the Professor of History and Political Science, said Fellows shall be in attendance in the Library not less than four hours each per day.

8. No person shall hold at one time more than one Fellowship or Graduate Scholarship, except in the case hereafter specified under paragraph 12 of this Statute, and any Fellow or Scholar may be dispossessed of the income of the Fellowship or Graduate Scholarship by action of the Faculty of the Graduate School, if guilty of any offense, or of any course of conduct, which in the opinion of said Faculty shall render the holder unworthy of retaining such Fellowship or Graduate Scholarship; but final action in such cases by the Faculty shall be by ballot, and shall require a two-thirds vote.

9. Vacancies in Fellowships and Graduate Scholarships that occur after October 1st, in order to be filled, shall require a three-fourths vote of the Faculty of the Graduate School present.

10. All persons elected to Fellowships and Graduate Scholarships are required, upon accepting their appointments, to file a bond of the face value of such Fellowship or Graduate Scholarship (with two sureties to be approved by the Treasurer), to pay the University in case of their resignation before the expiration of the time for which they were appointed, any sums which they may have received.

11. In all cases where Fellowships and Graduate Scholarships are not awarded, or when from any cause the income of one or more Fellowships or Graduate Scholarships may cease to be paid, or when the aggregate sum paid shall be less than the amount contemplated by this act, the surplus thus accruing shall be added to the principal of the loan fund for needy and meritorious students.

12. Either or both of the President White Fellowships in History and Political Science may, in the discretion of the Faculty of the Graduate School, be made a Travelling Fellowship for the purpose of study and investigation, the holder thereof making from time to time to said Faculty such reports of progress as may be required. In the case of a student of very exceptional ability and promise in the fields of either of these Fellowships, the two Fellowships may, in the discretion of said Faculty, for the sake of enabling very thorough research, be combined for a single year into one.

A class of Fellowships termed Honorary Fellowships was established in 1898. These Fellowships are open only to persons already holding the Doctor's degree. Holders of such Fellowships are to register in the Graduate School but are not to be charged tuition, and are to receive no emoluments. These Fellowships are to be conferred only upon persons actually in attendance at the University.

GRADUATE WORK IN THE SUMMER.

Members of the University Faculty who may desire to offer summer work for graduate students have been authorized by the Faculty of the Graduate School to do so; and students taking such summer work, may, at the discretion of their special committee, be relieved from residence during an equal part of the University year.* But no Graduate Student may receive credit for more than two term's residence during any twelve consecutive months; and work

*This statement refers not only to work done during the summer session, but to graduate work done at any time during the summer.

done during the summer must be done under the personal direction of the member of the committee having charge of the work.

Work done in the summer session of this University, under direction of a member of the Faculty of the Graduate School, may be counted for residence toward the Master's degree under the following conditions: One term's residence to be satisfied by three summer sessions, and two term's residence by five summer sessions.

It should be noted that in many departments no graduate work is offered in the summer session. A statement of the graduate work offered will be found in the Announcement of the Summer Session, which will be sent on application to the Registrar.

FEEES

A matriculation fee of \$5.00 is charged all students registering in the University for the first time.

Every registered student at Ithaca is charged an Infirmary fee of \$2.00 per term, payable within twenty days from the first registration day of the term. In return for the Infirmary fee, any sick student is admitted to the Infirmary, or in the case of contagious disease which under present rules cannot be there cared for, to the Ithaca City Hospital, if receivable under its rules, and is given without further charge a bed in a ward, board, and ordinary nursing for a period not exceeding two weeks in any one academic year.

A fee of \$7.50 per half-year, to cover cost of materials used, is required of all students in Agriculture.

Every person taking laboratory work in chemistry, physics, zoology, botany or entomology, must deposit with the Treasurer security for the materials to be used.

A diploma fee of \$20.00 is charged each person taking an advanced degree. This fee must be paid at least ten days before Commencement, and will be refunded if the degree is not conferred.

The annual fees for tuition for students registered in the Graduate School, including Fellows and Scholars, whether candidates for a degree or not, are as follows:

For students who take two-thirds or more of their work in the College of Arts and Sciences, \$100.00.

For students who take two-thirds or more of their work in Sibley College, the College of Civil Engineering, and the College of Architecture, or in the Medical College, \$150.00.

For students who take at least two-thirds of their work in the New York State College of Agriculture, free.

For students who are residents of New York, and who take at least two-thirds of their work in the Veterinary College, free.

FACILITIES FOR GRADUATE STUDY
AND
COURSES OF INSTRUCTION.*

UNIVERSITY LIBRARIES.

G. W. Harris, Librarian; G. L. Burr, Librarian of President White Library; A. R. H. Fraser, Librarian of Law Library; A. J. Lamoureux, Librarian of Agricultural Library; A. C. White, in charge of Classification; W. H. Austen, in charge of the Reference Library; Miss K. Dame, in charge of the Catalogue; H. Hermannsson, in charge of the Icelandic Collection; Miss. M. Fowler, in charge of the Petrarch and Dante Collections.

The University Libraries comprise the General Library of the University, the seven Seminary Libraries, the Law Library, the Flower Veterinary Library, the Barnes Reference Library, the Library of the State College of Forestry, the Goldwin Smith Hall Library, the Stimson Hall Medical Library, and the Library of the New York State College of Agriculture. The total number of bound volumes in them is now over three hundred and seventy-eight thousand and is increasing at the rate of about twelve thousand volumes a year. The number of periodicals, transactions, and other serials, currently received, is over two thousand, and of most of these complete sets are on the shelves. The General Library of the University, the Seminary Libraries, and the Forestry Libraries are all grouped under one roof in the Library Building, while the remaining collections are to be found in the buildings devoted to their respective subjects.

Among the more important special collections which from time to time have been incorporated in the General Library, may be mentioned: THE ANTHON LIBRARY, of nearly seven thousand volumes, consisting of the collection made by the late Professor Charles Anthon, of Columbia College in the ancient classical languages and literatures, besides works in history and general literature; THE BOPP LIBRARY, of about twenty-five hundred volumes, relating to the oriental languages and literatures, and comparative philology, being the collection of the late Professor Franz Bopp of the University of Berlin; THE GOLDWIN SMITH LIBRARY, of thirty-five hundred volumes, comprising chiefly historical works and editions of the English and ancient classics, presented to the University in 1869, by Professor Goldwin Smith, and increased during later years

*An index will be found at the end of this announcement. Courses enclosed in brackets will not be given in 1910-12.

by the continued liberality of the donor; THE PUBLICATIONS of the Patent Office of Great Britain, about three thousand volumes; THE WHITE ARCHITECTURAL LIBRARY, a collection of over twelve hundred volumes relating to architecture and kindred branches of science, given by ex-President White; THE KELLY MATHEMATICAL LIBRARY, comprising eighteen hundred volumes and seven hundred tracts, presented by the late Hon. William Kelly, of Rhinebeck; THE SPARKS LIBRARY, being the library of Jared Sparks, sometime President of Harvard University, consisting of upward of five thousand volumes and four thousand pamphlets, relating chiefly to the history of America; THE MAY COLLECTION, relating to the history of slavery and anti-slavery, the nucleus of which was formed by the gift of the library of the late Rev. Samuel J. May, of Syracuse; THE SCHUYLER COLLECTION of folk-lore, Russian history and literature, presented by the late Hon. Eugene Schuyler in 1884; THE PRESIDENT WHITE HISTORICAL LIBRARY, of about twenty thousand volumes (including bound collections of pamphlets) and some three thousand unbound pamphlets, the gift of ex-President White, received in 1891, especially rich in the primary sources of history, and containing notable collections on the period of the Reformation, on the English and French Revolutions, on the American Civil War, and on the history of superstition; THE SPINOZA COLLECTION, numbering four hundred and fifty volumes, presented in 1894, by ex-President White; The four remarkably rich collections given by the late Willard Fiske, comprising the DANTE COLLECTION, containing at present seven thousand volumes, the PETRARCH COLLECTION, containing about three thousand five hundred volumes; the RHAETO-ROMANIC COLLECTION, containing about thirteen hundred volumes, and the ICELANDIC COLLECTION, containing about nine thousand volumes; THE ZARNCKE LIBRARY, containing about thirteen thousand volumes and pamphlets, especially rich in Germanic philology and literature, purchased and presented in 1893 by William H. Sage; THE HERBERT H. SMITH COLLECTION of books relating to South America, purchased in 1896; a valuable collection of books on French and Italian society in the 16th and 17th centuries, presented by Professor T. F. Crane in 1896; THE FLOWER VETERINARY LIBRARY, the gift of ex-Governor Flower to Cornell University, for the use of the State Veterinary College, in 1897; THE EISENLOHR LIBRARY, containing about one thousand volumes on Egyptology and Assyriology purchased and presented in 1902 by A. Abraham; BAYARD TAYLOR's Correspondence and journals and his collection of Goethe literature, presented to the Library in 1905 by Mrs. Marie Taylor.

THE LAW LIBRARY includes the well known library of the late Nathaniel C. Moak, which was presented in 1893, by Mrs. A. M. Boardman and Mrs. Ellen D. Williams, as a memorial to Judge Douglas Boardman, the first Dean of the College of Law. In reports of the Federal Courts, reports of the several American state jurisdictions, and in English, Scotch, Irish, and Canadian reports, the law library is practically complete to date. The other English-speaking countries are largely represented. The library also possesses a full complement of text-books and statutes, and complete sets of all the leading law periodicals in English, thus offering facilities for scholarly research second to none in the country.

These collections and others such as these, making possible an exhaustive study of certain fields, are of the greatest service in the training of research. A similar purpose is served by the "seminary rooms" of the University Library. Thus (for the study of English, of the Classical languages, of the Germanic and Romance languages, of Philosophy, of Politics and Economics, of American and of European History), there have been provided in the Library Building seven such research rooms, each equipped with a carefully chosen body of reference books, to which advanced students in these fields have access. In connection with the scientific and technical laboratories similar collections have been formed, well supplied with reference books, standard works and sets of periodicals, conveniently arranged for study and research.

Cards of admission to the shelves in the stack-rooms, and to the White Historical Library, will be issued by the librarian to graduate students for the purpose of consultation and research. While the library is primarily a reference library, the privilege of taking books for home use is granted to all University students complying with the Library regulations.

SEMITIC LANGUAGES AND LITERATURES.

Professor: NATHANIEL SCHMIDT.

Special facilities for advanced work in this department are:

1. A collection of several hundred squeezes of inscriptions found in Syria and Arabia Petraea. These are chiefly in Arabic, Hebrew, Syriac, Assyrian, Nabataean, and Greek. In addition, there are also squeezes of Old Egyptian, Coptic, and Hittite inscriptions.
2. A collection of several thousand photographs taken in Syria and Arabia Petraea, and slides taken from these photographs.
3. Reproductions of inscriptions and objects of art in the Museum of

Casts. 4. A valuable collection of Arabic, Hebrew, Samaritan-Ethiopic, and Coptic manuscripts secured in Syria. 5. The Eisenlohr library, especially rich in Egyptology. 6. The Fiske collection of Arabic books.

The candidate for advanced degrees is offered opportunities of studying every Semitic language and dialect, and also Shumerian, Old Egyptian, and Coptic. He may, if he so chooses, specialize in Semitic literature, or in Oriental History.

The following courses may be taken in partial fulfillment of the requirements for the Master's or the Doctor's degree:

1. **Advanced Hebrew.**
2. **Neo-Hebraic.**
3. **Ethiopic.**
4. **Assyrian.**
5. **Shumerian.**
6. **Aramaic** (Mandaic, Babylonian Talmudic, Syriac, Nabataean, Palmyrene, Galilaean, Samaritan, and Judaeae).
7. **Arabic** (Sabaeae and Minaean, Classical, Modern).
8. **Egyptian.**
9. **Coptic.**
10. **Comparative Semitic Philology.**
11. **Semitic Epigraphy** (in Semitic Seminary).
12. **Hebrew Literature** (in Semitic Seminary).
13. **The History of Asia.**
14. **The History of Africa.**
15. **The Sources of Oriental History** (in Historic Seminary.).

GREEK.

Professors: J. R. S. STERRETT; G. P. BRISTOL.

Instructors: E. P. ANDREWS, Archaeology; H. L. JONES, Greek.

The general library and the special library of over two thousand volumes in the seminary rooms afford ample facilities for graduate work. The special library is rich in complete sets of philological and archaeological periodicals in all languages, and contains all the standard works that form the laboratory apparatus of the graduate student. Other books will be transferred from the general library to the seminary rooms as they are needed.

The Museum of Classical Archaeology contains a collection of casts which furnishes ample material for the illustration of the history of Greek and Roman sculptural art. The museum is also equipped with a fine collection of Greek coins, with a full set of the

British Museum electrotypes, with a collection of Greek vases selected to illustrate the periods of Greek ceramic art, with reproductions of Mycenaean objects in metal work, and with paper impressions of inscriptions.

Courses 10 to 26 are adapted to specializing study. They are fully described in the University Register. The following courses are intended for graduate students exclusively.

30. **The Tragedies of Sophocles.** This course is devoted to the study of the entire works of some one author, or of a particular field of literature; in 1910-1911 Sophocles. Special attention is given to the rhythmical and metrical structure and to the practical reading of the choral odes. Lectures on the antiquities of the stage. This course will be varied from year to year. W., F., 12. Professor STERRETT.

37. **The Agamemnon of Aeschylus.** Textual criticism and literary interpretation. First term. T., Th., 11. Professor STERRETT.

38. **Pindar.** A study of the Olympian and Pythian Odes. The fluent rhythmical reading of the odes is insisted upon. Second term. T., Th., 11. Professor STERRETT.

40. **Greek Seminary.** Homeric questions from the archaeological point of view. Papers and discussions. W., 2-4. Professor STERRETT.

41. **Archaeological Seminary.** Greek Epigraphy. First term: Greek epichoric alphabets and dialectical inscriptions. Second term: Attic inscriptions. The large collection of paper impressions of inscriptions will be used. M., 3-5. Mr. ANDREWS.

General and Comparative Philology. During the second term of 1910-11, Professor BRISTOL will be ready to assist students who wish to study questions dealing with the use of linguistic evidence in the determination of questions of race and culture, and of problems of prehistory in Europe. The reading of Tacitus' *Germania* will be made the centre for such study.

LATIN.

Professors: C. E. BENNETT; H. C. ELMER; C. L. DURHAM.

Graduate students in Latin have the use of the Latin Seminary, consisting of two rooms in the Library building. The Seminary contains several thousand volumes of texts and other works of reference, including complete sets of all the journals of classical philology. Two Greek and Latin fellowships and one scholarship

are annually awarded. The following courses are offered for graduates:

41. **Latin Seminary.** The work of the Seminary for 1910-1911 will consist of the textual and exegetical study of Horace, combined with the reading of all of Horace's works. The object of the Seminary is to familiarize its members with the methods and habits of independent investigation. The work, therefore, as far as possible, is thrown into the hands of the students themselves. Students who intend to take this course should confer with the instructor before Commencement in order that necessary books may be ordered from abroad in due season. The textual and exegetical work, T., 2-3:30. Reading S., 10. Professor BENNETT.

42. **History, Scope, and Aim of Latin Study.** The history of Latin study since the Renaissance, an outline of the various fields of investigation, stating the present state of knowledge in each, along with the chief problems still awaiting solution; a full bibliography. W., 11. Professor BENNETT.

[43. **Historical Latin Syntax.** Lectures on the moods and tenses of the Latin verb, with special reference to the subjunctive,—its primitive meaning and its development in subordinate clauses. T., Th., 10. Professor BENNETT. To be given in 1911-1912.]

44. **Historical Grammar of the Latin Language.** A study of Latin sounds and inflections from the historical point of view. T., Th., 10. Professor BENNETT.

45. **Latin Writing.** Advanced course. One hour. Professor ELMER.

46. **The History and Development of Latin Epic Poetry.** One hour throughout the year. Professor ELMER.

47. **Vulgar Latin.** A study of the extension of the Latin language to the Roman provinces, and an investigation of the phonology, the flexions, and the syntax of Vulgar Latin. Consentius' *de metaplasmis et barbarismis*; *Silviae vel potius Aetheriae perigrinatio ad loca sancto* (ed. Heraeus). A reading knowledge of French and German is required. First term. Three hours. Professor DURHAM.

48. **Tacitus' Agricola.** A literary and historical study. A reading knowledge of French and German is required. Second term. Two hours. Professor DURHAM.

49. **Ennius.** Fragments of the *Annales*. Second term. One hour. Professor DURHAM.

[50. **Latin Epigraphy.** The interpretation of selected inscriptions. Special topics in the administrative history of the Roman

Empire will be assigned for investigation. A reading knowledge of French and German is required. Two hours. Professor DURHAM. To be given in 1911-1912.]

[51. *Carmina Latina Epigraphica* (ed. Bücheler). One hour. Professor DURHAM. To be given in 1911-1912.]

Latin Paleography. See History, course 43.

Roman History. See Ancient History.

GERMANIC LANGUAGES.

Professors: W. T. HEWETT*; A. B. FAUST; P. R. POPE; H. DAVIDSEN.

Instructor: A. LEROY ANDREWS.

In the advanced courses of the department, the work is two-fold, literary and philological. The history of German literature from the earliest period to the present day is given in outline lecture courses with collateral reading. Special topics are selected for more minute study, such as the epic and lyrical poetry of the Middle High German period, the literature of the Reformation, the Classical period, the Romantic School, the modern drama. The courses offered in philology include the study of Gothic, Old and Middle High German, and Old Norse. They afford also an introduction to the science of language and the principles of Phonetics.

The seminaries in German literature and philology aim to impart the principles and methods of rigid investigation. A teachers' course is given on class-room methods and theories of instruction in the modern languages.

The work of the department is greatly assisted by exceptional library facilities. The nucleus was formed by the acquisition of the Zarncke library, one of the largest collections of rare books for the study of German literature and philology ever brought to America. With constant enlargements the library has become one of the most serviceable in the country. The University Library also contains the Willard Fiske collection of books on Icelandic literature, one of the most complete in existence. A German seminary room in the general Library Building contains books for ready reference, including philological reviews.

*Absent on leave.

An organization connected with the department which has gained strength and importance in fostering interest in German studies at Cornell University is the *Deutscher Verein*. The purpose is both educational and social. At its bi-weekly meetings, literary and musical programs are rendered, sometimes formal, at other times informal, the use of the German language is encouraged, and opportunity is afforded for a closer acquaintance between faculty and students.

11. **Goethe's Letters and Lyrics.** A study of the poet's life and art. First term. M., W., F., 9. Assistant Professor FAUST.

12. **Goethe's Faust.** Parts I and II. Second term. M., W., F., 9. Assistant Professor FAUST.

[15. **German Literature in the Nineteenth Century.** 1800-1850. Lectures in German and collateral readings. First term. Assistant Professor DAVIDSEN. Not given in 1910-11.]

[16. **German Literature in the Nineteenth Century,** 1850-1900. Lectures in German and collateral readings. Second term. Assistant Professor DAVIDSEN. Not given in 1910-11.]

17. **The Literature of the Reformation.** Lectures in German; illustrative readings in the works of Luther, Sachs, Hutten, Murner, Fischart, etc. First term. M., W., F., 11. Assistant Professor DAVIDSEN.

19. **Lessing, His Life, Work and Period.** Lectures in German and collateral readings. Second term. M., W., F., 11. Assistant Professor DAVIDSEN.

19. **Hebbel.** A study of his works and his theory of the drama. First term. Two hours. Assistant Professor DAVIDSEN.

20. **Ibsen.** A study of his representative dramas (in the German translation), and of his influence on modern German literature. Second term. Two hours. Assistant Professor DAVIDSEN.

29. **Elementary Middle High German.** Bachmanns *Mittelhochdeutsches Lesebuch*; Pauls *Mittelhochdeutsche Grammatik*. First term. Three hours weekly. Assistant Professor POPE.

30. **Advanced Middle High German.** Detailed study of grammar. Reading of the court epics and lyrical poetry. Special study: Gottfried von Strassburg, and Walther von der Vogelweide. Second term. Three hours weekly. Assistant Professor POPE.

31. **Gothic.** Grammar: Wulfilas translation of the Bible. This course will serve as a general introduction to Germanic Philology. Streitbergs *Gotisches Elementarbuch*. First term. Three hours weekly. Assistant Professor POPE.

32. **Old High German.** Continuation of Course 31. Braune's

Althochdeutsche Grammatik, and Althochdeutsches Lesebuch. Second term. Three hours weekly. Assistant Professor POPE.

(33. **Old Icelandic.** Old Norse grammar; readings from saga-literature and the Eddic poems. Three hours through the year. Dr. ANDREWS. Omitted in 1910-11.)

34. **Modern Scandinavian.** Danish grammar and standard authors. First term. Three hours weekly. Dr. ANDREWS.

35. **Modern Scandinavian.** Reading of standard Norwegian authors. Second term. Three hours weekly. Dr. ANDREWS.

36. **History of Modern High German.** The origins and development of the present German literary language. Open to students who have had Middle High German. Second term, two hours weekly. Dr. ANDREWS.

37. **Seminary in German Literature.** First term, subject—The Classical German drama. Second term, subject—The young Goethe. Two hours weekly. Assistant Professor FAUST.

(38. **Philological Seminary.** Subject for 1911-12. Old Saxon literary monuments. Two hours weekly. Assistant Professor POPE.)

39. **Teachers' Course.** Methods of instruction, principles of phonetics, selection of text-books, pedagogical questions of importance to the teacher of German will be discussed. Second term. Two hours weekly. Assistant Professor FAUST, aided by other members of the department.

ROMANCE LANGUAGES AND LITERATURES.

Professors: W. W. COMFORT; E. W. OLMSTED; O. G. GUERLAC; A. LIVINGSTON; A. GORDON.

Instructors: J. F. MASON; L. PUMPELLY.

The collection of French books in the University Library is very large, and offers excellent facilities for advanced work. The Spanish library, though in large measure recently acquired, is quite representative. Objects of special pride to the Department are the unrivalled Dante and Petrarch collections, the gift of the late Willard Fiske, who presented likewise to the University a unique collection of Rhaeto-Romance works. Smaller collections of Portuguese and Provençal books are also to be found in the University Library. The Department has a seminary library of several thousand volumes, including a complete set of bound periodicals. A University Fellowship (of the annual value of \$500) is at the disposal of the Department.

Subjoined is a list of courses which may be taken by candidates for advanced degrees in partial fulfillment of the requirements. It is intended that about one-third of the courses taken by such candidates shall be from the group of courses "primarily for graduates." All candidates for advanced degrees in Romance subjects must have as a prerequisite a thorough reading knowledge of Latin, French, and German.

A candidate for the Doctor's degree must follow all the advanced courses given in the branch in which his major subject lies, and such courses as give a comprehensive view of the field of his minor subjects; and must present a thesis embodying the results of his original investigations in some field of Romance literature or philology. It is intended that the last year of preparation for this degree shall be spent chiefly upon the thesis.

The following courses may be taken in satisfaction of the requirements for minor subjects:

Vulgar Latin. This course (Latin 46), given by the Department of Latin, must be taken during the first term by all candidates for the Master's degree. First term. Three hours.

4. **History of French Literature.** Lectures and reports on outside reading. Two sections, one conducted in English and one in French. Second term. Three hours.

9. **The French Philosophers, Moralists, and Historians** from Descartes to Taine. First term. Three hours.

10. **History of French Literary Criticism.** Second term. Three hours.

18. **Lyric Poetry.** The history of French lyric poetry since the 15th century. Lectures and outside reading. One hour.

20. **French Dramatic Literature.** Study of the French drama from the middle of the sixteenth century to the present time. Lectures and reading with reports. Three hours.

23. **Romance Philology.** Lectures on the phonology and inflections of Old French. Study of the oldest texts. This course must be taken during the second term by all candidates for the Master's degree. Second term. Three hours.

24. **Medieval French Literature.** Lectures, outside reading and reports. A reading knowledge of Old French is not required. One hour.

26. **Teachers' Course.** Intended primarily for those preparing to teach, and conducted by the various members of the Department. Methods of instruction in phonetics, grammar, and literature will be considered in relation to the needs of the teacher. First term two hours.

32. **Second Year Italian.** Rapid reading of modern Italian prose and poetry. Three hours.

33. **Classic Italian Literature.** Dante, Boccaccio, Petrarch. Open only to students who have had course 32 or its equivalent. Three hours.

42. **Second Year Spanish.** Rapid reading of modern Spanish authors: Alarcón, Galdós, Valera, Valdés, etc. Three hours.

46. **Classic Spanish Literature.** Cervantes, Calderón, Lope de Vega. Two hours.

The following courses may be taken in partial fulfillment of the requirements for the major subject:

28. **Old French Literature.** Rapid reading of texts, with consideration of their literary relations. In 1910-11 the texts studied will be the romances of Chrétien de Troyes. Open only to graduates who have had Latin 46 and French 23 or their equivalent. Two hours.

33. **Old Italian.** The earliest texts. Lectures on Italian literature. Two hours.

47. **Old Spanish.** The earliest texts: Poema del Cid, etc. Two hours.

48. **Spanish Seminar.** The Spanish Mystics. Two hours.

50. **Portuguese.** Grammar and literature. Camoes, *Os Lusíades*.

50. **Provençal.** Philology and Literature. Two hours.

ENGLISH.

Professors: M. W. SAMPSON; W. STRUNK, JR.; F. C. PRESCOTT; C. S. NORTHUP; LANE COOPER; J. Q. ADAMS, JR.

Instructors: B. S. MONROE; A. L. ANDREWS; E. G. COX; E. J. BAILEY; R. R. KIRK.

Among the books available to the student are complete sets of the publications of the Early English Text, Chaucer, Scottish Text, Percy, English Dialect, Shakespeare, New Shakspeare, Spenser, Philological, Malone, and other societies; of the various Bullen and Grosart reprints; and of all the important periodicals dealing with the English language and literature. Most of the foreign dissertations on English subjects, standard and other editions of individual authors, English and American, and several special collections, are also in the library, which is exceptionally

good in the field of Old English, and in the Elizabethan and Victorian periods. The department has a seminary room in the library building. A fellowship and a scholarship are annually awarded.

Candidates for an advanced degree may take their major work in literature or language. In general, thirty-six hours (i. e., three full years) of college English are required before a student may enter upon candidacy for an advanced degree. Work in philosophy, history, and advanced languages, ancient and modern, may be counted against shortage in undergraduate English, two hours in these subjects standing for an hour in English. All candidates must complete as much work in Old English as is represented by course 11; must have a general knowledge of English literature and English history; and must accomplish satisfactory work in research. Candidates for the master's degree must have a practical knowledge of French or German, sufficient to make use of scholarly works in one of those languages, and candidates for the doctor's degree must have a similar practical knowledge of both French and German.

In addition to directing research beyond the limits of the numbered courses given below, members of the instructing staff stand ready to supervise original work in the fields here noted: Professor SAMPSON, dramatic structure; Professor STRUNK, Old English; Professor PRESCOTT, relations of English and American literature; Professor NORTHUP (1911-12), Middle English romances; Professor COOPER, early nineteenth century poetry; Professor ADAMS, Elizabethan drama; Dr. MONROE, Middle English; Dr. ANDREWS, eighteenth century literature; Dr. COX, Celtic; Dr. BAILEY, Victorian poetry; Mr. KIRK, Victorian prose.

The subjoined courses may be taken in partial fulfilment of the requirements for an advanced degree:

11. Old and Middle English. Reading of selections from the Old English Chronicle, King Alfred, Ælfric, and the simpler poetry; and of the later Chronicle, Orm, Layamon, and other representative Middle English texts, including Chaucer. Supplementary lectures on the growth of the language. M., W., F., 11. Dr. MONROE.

[18a. **Linguistics.** A survey of the principles of the life and growth of language. An elementary course of lectures and assigned reading, the illustrative material being chosen mainly from English as a living speech. First term. Dr. MONROE.]

25b. Old English Readings. Open to students who have completed the Old English of course 11. Reading of further Old English works, including portions of Beowulf. M., W., 3. Second term. Dr. MONROE.

32. **Ballad Literature.** English and Scottish popular ballads; study of the ballad as a form of literature; the theories of its origin and development; its relation to other forms of early narrative poetry and to the modern literary ballad; comparisons with kindred ballads of other nations. M., W., F., 12. Dr. COX.

33. **Eighteenth Century Prose.** The essays, political satires, novels, and orations. Stress will be laid on a few leading writers. Dr. ANDREWS.

37. **Shakespeare.** A study of representative plays, together with a survey of the Elizabethan period and its literature. M., W., F., 10. Professor STRUNK.

38b. **English Poetry, Eighteenth Century.** Second term. A study of Pope, Thomson, Gray, Goldsmith, Burns; readings from lesser poets. T., Th., S., 12. Assistant Professor PRESCOTT.

41. **The English Drama to 1642.** First term: a study of the origin of the drama, miracles, moralities, interludes, and the first regular comedies and tragedies. Second term: a study of Elizabethan society and playhouses, characteristic plays of Lyly, Peele, Kyd, Greene, Marlowe, Jonson, Beaumont and Fletcher; and assigned readings in other representative dramatists. T., Th., S., 11. Assistant Professor ADAMS.

51. **Dante in English.** Preliminary reading, and a detailed study of selections from the *Divine Comedy* and *The New Life*. A knowledge of Italian, although desirable is not required. M., 3-5. Assistant Professor COOPER.

52. **Victorian Poetry.** Tennyson, Browning, Matthew Arnold, Clough, William Morris, Swinburne and the Rossettis. Lectures, readings, reports, and discussions. M., W., F., 9. Dr. BAILEY.

[54. **Methods and Materials in the Study of English.** Reading of important treatises on the method of scholarship; a study of the relations between English and similar disciplines; an introduction to the bibliography of English. Applicants must be prepared to read French and German. Assistant Professor COOPER.]

[56a. **The Arthurian Legends.** First term. Studies in the origin and treatment of Arthurian legends in the chronicles and the romances, with some attention to the use of the legends by modern poets. Assistant Professor NORTHUP.]

59. **Dramatic Structure.** A study of the principles of dramatic construction, based mainly upon English drama, of the seventeenth and nineteenth centuries, but with frequent illustration from classical and modern continental drama. M., W., F., 12. Professor SAMPSON.

61. **Problems in Tudor-Stuart Drama.** Assistant Professor ADAMS.

62. **The Romantic and Epic Material of the Medieval Irish.** The Ossianic cycle of romances, and their relation to Macpherson's Ossian; the epic of the Tain, its form and content. Dr. COX.

63. **Layamon's Brut.** With special reference to its connection with the Arthurian legend. Dr. MONROE.

65. **The Principles of Literary Criticism.** A study, in part historical, of the most important theories of poetry. W., 3-5. Assistant Professor COOPER.

[66. **The Epic and the Romance.** A study of the forms of classic medieval narrative, and especially of selected Middle English romances and their relations to continental literature. Assistant Professor NORTHUP.]

67. **The Phonology, Inflections, and Metre of Old English.** The relation of Old English to Modern English and to German. Readings in Elene or in Beowulf. Professor STRUNK.

68. **American Literature.** Assistant Professor PRESCOTT.

69. **Elizabethan Dramatic Structure.** Professor SAMPSON.

PHILOSOPHY AND PSYCHOLOGY.

Professors:

J. E. CREIGHTON,* Logic and Metaphysics; E. B. TITCHENER, Psychology; FRANK THILLY, Philosophy; W. A. HAMMOND, Ancient and Medieval Philosophy; ERNEST ALBEE, Philosophy; I. M. BENTLEY, Psychology; G. H. SABINE,** Logic and Metaphysics.

The Departments of Philosophy and Psychology are known as "The Susan Linn Sage School of Philosophy". This school owes its existence to the generosity of the late Henry W. Sage, who, in addition to endowing the Susan Linn Sage philosophical professorship, made a further gift of \$200,000, for the purpose of providing permanently at Cornell University for philosophical instruction and investigation of the most varied kind and of the highest order. The endowments of the School of Philosophy enable it to secure whatever material facilities are required for the successful prosecution of philosophical studies and research. The more important philosophical journals, American and foreign, are received by the Library, which is also well equipped with philosophical and psy-

*Absent on sabbatic leave 1910-1911.

**Acting assistant professor of Logic and Metaphysics, 1910-1911.

chological works, and is particularly rich in literature relating to Plato, Spinoza, and Kant.

The larger part of the work of the Sage School is adapted to the needs of graduates of this and other institutions who are preparing themselves to be teachers or investigators in Philosophy and in allied fields of study. A student who has made a special study of philosophy during his junior and senior years may still take a graduate course of three years' work with history or philosophy or psychology or metaphysics, or ethics as his major subject. For the encouragement of higher studies and research in every branch represented by the School of Philosophy, there have been established six scholarships of the annual value of \$300 each, and three fellowships of the annual value of \$500 each.

The research department of the Psychological Laboratory in Morrill Hall contains fifteen rooms, two of which are used as the private laboratories of the officers of instruction, one as seminary room, and one as workshop; the remainder are at the disposal of students for advanced work. The experimental rooms are furnished, as required, with gas, water, and the direct and alternating electric current; they are also connected by an elaborate wiring system, so that two or more rooms may be employed together in a single investigation. There are two dark chambers. The workshop is adequately equipped, and a skilled mechanic is in the service of the department. The Laboratory possesses standard instruments of precision for all the principal modes of experiment upon human consciousness, and is especially rich upon the side of acoustics; while materials are available, or can be supplied, for the study of certain problems in comparative psychology. The equipment is undergoing continual improvement, and special apparatus required for thesis-work is at once constructed or procured. The results of investigations pursued in the Laboratory are published in *The American Journal of Psychology*.

Graduate students further have the use of the unusually complete sets of demonstrational and teaching apparatus contained in the Demonstrational Laboratory (Goldwin Smith Hall) and the Undergraduate Laboratory (Morrill Hall).

It should be mentioned that Professor Titchener devotes his entire time to the conduct of the Graduate Laboratory.

The Philosophical Seminary Room in the Library Building is provided with complete sets of the leading philosophical journals, lexicons, and other books of reference, and the more important works in the several branches of Philosophy. The current num-

bers of the philosophical journals are also found in the room. Liberal provision is made for the constant growth of this special Library.

The Philosophical Review, established by the University, is a bi-monthly journal devoted to the interests of Philosophy, embracing under that title Logic, Ethics, Metaphysics, Psychology, Aesthetics, and Philosophy of Religion. It is issued under the editorship of Professor J. E. Creighton, and has now completed its eighteenth year of publication. Although supported by private endowment, it is not the organ of any institution or of any philosophical school, but by the terms of the subsidy is an absolutely free organ of contemporary philosophy. Graduate students assist by contributing summaries of periodical literature for publication in the Review, and are thus kept in close touch with the results of recent investigations in their several departments of work. In addition to this, graduate students have contributed a number of original articles to the Review.

Under the title of the *Cornell Studies in Philosophy*, a series of monograph studies is published from time to time as representative of the work done by graduate students in the departments of Philosophy. These monographs are issued under the editorial supervision of the Professors of Philosophy, and consists mainly of superior doctoral dissertations. The series furnishes also a channel for the publication of research work other than that of the thesis. Seven monographs in the series have been issued.

The School is devoted to the free and unhampered investigation of truth in regard to all those questions of human inquiry which are embraced by Logic, Psychology, Ethics, Metaphysics, and the History and Philosophy of Religion. In the courses of instruction are represented the chief branches and problems of philosophy. Work devoted to the thesis for the doctorate is intended to secure the maximum of specialized training and the power of independent inquiry and statement of results. In all departments particular stress is laid upon the historical study of philosophical ideas as the best means of securing a comprehensive grasp of fundamental problems and values.

The following courses are offered:

2. **Experimental Psychology.** Laboratory exercises in human psychology, covering both qualitative and quantitative methods and problems. Provision also for laboratory work with animals. M., W., F., 3. Assistant Professor BENTLEY and Dr. GEISSLER.

3. **General Psychology.** Lectures covering the field of human psychology and assuming an elementary knowledge of the subject. M., W., F., 12. Assistant Professor BENTLEY.

4. **Comparative Psychology.** A descriptive account of consciousness in vertebrate and invertebrate forms, with demonstrations of methods and apparatus. T., Th., 11. Assistant Professor BENTLEY.

13. **History of Philosophy.** Lectures, prescribed reading, and occasional essays. Intended primarily for the general student. A general account of the history of philosophical speculation from its origin among the Greeks to the present time. The various philosophical systems in their relation to the science and general civilization of the ages to which they belong, and their application to social, political and educational problems. Rapid survey of the Greek, Roman and Medieval periods; theories and problems of modern times; study of the speculative problems of the present century; examination of the philosophical meaning and importance of the notion of evolution or development. Offered as graduate work to students whose major subject is outside the department of philosophy. T., Th, S., 9. Acting Assistant Professor SABINE.

21. **History of Ancient and Medieval Philosophy.** Lectures and assigned readings. History of philosophical ideas from the early Greek cosmogonies to the Renaissance; the development of occidental philosophy and its relations to oriental influence; the various systems and fragments of systems from Thales to the Neo-Platonists and the later influences of these systems in Rome, more particularly the ethical systems of Epicureanism and Stoicism; speculative thought in the Middle Ages. These philosophical ideas will be discussed in connection with the contemporaneous conditions of science and culture, and as the historical antecedents of modern intellectual life. T., Th., 9. Professor HAMMOND.

[22. **Types of Metaphysical Theory.** First term. Lecturers and discussions. Professor CREIGHTON. To be given in 1911-1912.]

23. **Philosophical Results and Applications.** A summing up of the results that seem, with regard to the fundamental problems of philosophy, to be established by its historical development; practical applications of these results to social, political, and educational questions; nature and practical significance of the problems under discussion at the present time. First term. T. Th., S., 12. Acting Assistant Professor SABINE.

26. **The History of Ethics.** Lectures, discussions, and essays. A history of ethical reflection with special reference to the develop-

ment of theories of morals in their relation to one another and to the general influences of their times. First term: study of the moral theories and ideals of the people of ancient Greece and Rome and of the Middle Ages. Second term: careful examination of modern theories, with special reference to the development of English ethics. (Either term of work may be taken separately.) M., W., 11. Professors HAMMOND and ALBEE.

27. **The Republic of Plato.** Reading of the Greek text. Intended for students of Greek literature as well as of Greek philosophy. The Republic will be read in its entirety, the main attention being devoted to the content. The text used will be that of Hermann. Zeller's *Plato and the Older Academy* and Pater's *Plato and Platonism* are recommended as commentaries. M., W., F., 9. Professor HAMMOND.

28. **Rapid Reading of German Philosophy.** Designed to aid students in acquiring facility in translation and a knowledge of German philosophical terminology. Windelband's *Platon* will be translated. T., 2. Professor HAMMOND.

29. **Empiricism and Rationalism.** Lectures, discussions, and essays. The distinctive methods of the empirical movement, as represented by Locke, Berkeley, and Hume, and of the rationalistic movement, as represented especially by Descartes, Spinoza, and Leibniz. The books used will be Locke's *Essay*, Hume's *Treatise of Human Nature*, and Leibniz's *Philosophical Works* (Duncan's translation). First term. T., Th., S., 11. Professor ALBEE.

30. **The Critical Philosophy of Kant.** Lectures, discussions, and essays. Careful study of the *Critique of Pure Reason*, Müller's translation being used; the relations in which the three Critiques of Kant stand to each other. Frequent references will be given to standard commentaries and to the more recent literature on the subject. Second term. T., Th., S., 11. Professor ALBEE.

[31. **German Pessimism, with special reference to Schopenhauer.** Lectures, discussions, and essays. First term. Three hours. Professor ALBEE. To be given in 1911-1912.]

32. **Early Rationalism: Spinoza and Leibniz.** Lectures, discussions, and essays. The most characteristic works of Spinoza and Leibniz, and a presentation of the divergent tendencies represented by these typical exponents of early rationalism; influence of both upon the later development of philosophy, and their significance for contemporary philosophical thought. M., W., F., 12. Professor ALBEE.

33. **Problems and Methods in Recent Philosophy.** Lectures. Detailed examination of certain problems involved in current philosophical investigation, as a basis for a positive treatment of some of the fundamental problems of the present day. T., Th., 12. Professor ALBEE.

[34. **Logical Theory.** Lectures, reading of prescribed authors, and discussions. Two hours. Professor ALBEE. To be given in 1911-1912.]

35. **Thomas Aquinas.** Selections from the *Summa Theologica*. A study, in connection with the reading of the text, of the general system of Thomism and the completion of medieval philosophy. Two hours. Professor HAMMOND.

36. **Aristotle's Ethics.** Reading of the Greek text. The *Nicomachean Ethics*, Book I-IV and X. Intended for such students of Greek as wish to read rapidly through an Aristotelian treatise and for such students of philosophy as wish to examine Aristotle's ethical ideas in the original. M., 12. Professor HAMMOND.

37. **Advanced Ethics.** Readings, discussions, and essays. A study of the dominant types of modern ethical systems. First term: Mill's *Utilitarianism*, Spencer's *Data of Ethics*, and Sidgwick's *Methods of Ethics*. Second term: Kant's ethical system and Schopenhauer's criticism of the same. Kant's *Fundamental Principles of Ethics and Critique of Practical Reason*, and Schopenhauer's *Basis of Morality* will be read and discussed. W., F., 10. Professor THILLY.

38. **Idealistic Theories of Ethics.** A study of Fichte's *System der Sittenlehre*, Hegel's *Rechtsphilosophie*, and Green's *Prolegomena to Ethics*. T., 10-12. Professor THILLY.

[39. **Ethical Seminary.** T., 10-12. Professor THILLY. To be given in 1911-1912.]

40. **Seminary in Logic and Metaphysics.** F., 10-12. Acting Assistant Professor SABINE.

41. **Seminary in Ancient and Medieval Philosophy.** In this Seminary, students will be directed in thesis work, or in any special investigations they may be carrying on within the department of ancient and medieval philosophy. Once a week in the hours named below (or at other times to be arranged) the members of the Seminary will read the *Politics* of Aristotle, and the *Republic* of Plato (Jowett's translation). W., 3-5. Professor HAMMOND.

Seminary in Psychology. Study of general questions of psychological theory and of the relations which psychology sustains to philosophy and to other disciplines. Assistant Professor BENTLEY.

EDUCATION.

Professors: CHARLES DEGARMO; G. M. WHIPPLE.

The educational museum contains collections illustrating the work done in various school grades, statistical charts, a full assortment of text-books of American and German schools, including a relatively complete collection of the texts used for industrial training in the German continuation schools, an extensive high-school and college exhibit of the raw materials of commerce, a kindergarten exhibit, and other appropriate material.

The educational laboratory has a collection of apparatus for demonstration, and of instruments of precision for research in connection with school hygiene, the experimental study of school children (with special reference to the conduct of physical and mental tests), and the psychological phases of education in general. This equipment is being constantly enlarged and apparatus needed for special investigations is at once procured.

Graduate students selecting education for their major subject will be expected to take from one-half to two-thirds of their work in the studies that are fundamental to an adequate mastery of educational theory and practice. These fall naturally into two groups, the philosophical and the social. The philosophical studies include psychology, ethics, and the history of philosophy; the social studies include political, social, and economic science. All graduate courses in education presuppose familiarity with the history and principles of education and with educational psychology. Candidates for advanced degrees whose preparation in this respect is inadequate must make up this deficiency by taking the appropriate undergraduate courses; this work will not, however, be counted toward the advanced degree. The following courses are offered:

8. Mental Development. First term. Lectures, readings, and essays. The genetic phases of mental life with special reference to their application to educational problems: evolutionary factors in mental development, heredity, eugenics, recapitulation, the culture-epoch theory, instinct: the child-study movement: the psychology and pedagogy of adolescence. M., T., W., Th., 3. Assistant Professor WHIPPLE.

9. Ethical Training in Secondary Schools. First term. Readings, discussions, and reports. Regulative principles of conduct under static and under dynamic social conditions, the adolescent in modern society, moral habits, the function of interest in the moral life, the moral value of school studies, ethical training through athletics, etc. F., 2-4. Professor DEGARMO.

10. School Administration. Second term. Readings, discussions, and reports. The comparative study of school administration in American cities and in foreign countries, especially Germany and England. F., 2-4. Professor DEGARMO.

11. Philosophy of Education. Lectures, discussions, and study of educational sources. Advanced educational theory, following in the main MacVannel's outline; evolution and idealism as bases of education; personality and environment; the individual and society; moral institutions; democracy and education; the course of personal development; the school as a social institution; the course of study. Th., 3-5. Professor DEGARMO.

12. Experimental Study of School Children. First term. Lectures, demonstrations, and reports. An examination of the literature dealing with anthropometric and psychological tests of school-children; demonstrations of the more important tests. Students who wish practice in conducting school tests may register for experimental work in Course 14. M., T., W., 2. Assistant Professor WHIPPLE.

14. Seminary for Experimental Investigation. Assistant Professor WHIPPLE.

15. Seminary for the Science and Art of Education. The work of the seminary will consist of discussions, reports, and theses upon current educational problems, partly of a social and partly of a psychological nature; reviews of important new books and of the current periodical literature. T., 7:30-9:30 P. M., on alternate weeks. Professors DEGARMO and WHIPPLE.

HISTORY AND POLITICAL SCIENCE.

Professors: G. L. BURR, Medieval History; NATHANIEL SCHMIDT, Oriental History; C. H. HULL, American History; R. C. H. CATTERALL, Modern European History; H. A. SILL, Ancient History; J. P. BRETZ, American History.

J. W. JENKS Economics, and Politics; W. F. WILLCOX, Economic and Statistics; F. A. FETTER, Economics and Distribution; E. W. KEMMERER, Economics and Finance.

Instructors: T. W. RIKER, Modern European History; JOHN BAUER, Economics; W. B. CATLIN, Economics; W. E. LAGERQUIST, Economics and Statistics; J. R. TURNER, Economics.

The departments of History and Political Science have been united since 1887 in the President White School of History and

Political Science. This bears the name of the first president of the University, in especial recognition of the gift of his valuable collection of historical literature to the University Library.

The aims of the President White School are threefold: first, the advancement of knowledge by investigation and publication, in the fields of history, economics, politics, jurisprudence, and social science; second, the training of scholars and teachers in these departments of study; third, the training of men and women for the public service, for business, and for professions such as law, journalism, and philanthropy.

The School issues the *Cornell Studies in History and Political Science*, of which two volumes have appeared:

1. Money and Credit Instruments in their Relation to General Prices. By Edwin Walter Kemmerer, Ph.D., Professor of Economics and Finance in Cornell University. First edition, 1907. Second edition, 1909.

2. Sargon of Assyria. By Albert TenEyck Olmstead, Ph.D., Instructor in History in the University of Missouri. 1908.

History.

A graduate student in history should have a sufficient knowledge of general history and of geography. He should be able to speak and write good English. He should have a reading knowledge of French, of German, and of any other language necessary for the thorough study of his special subject. It is highly desirable that he should have had the necessary linguistic training as an undergraduate; but deficiencies in this respect may sometimes be made up after entering upon graduate work.

The University Library contains some seventy or eighty thousand volumes dealing with history. In large part these are to be found in the large room known as the White Historical Library. The qualities of the library which best suit it to the needs of graduate students are its facilities for work in the midst of its books, and the special collections which equip it for the training of minute and exhaustive research. Its historical seminary rooms in the Library building are amply furnished with atlases, cyclopedias, dictionaries, bibliographies, and other useful works of reference, and afford easy access to the shelves of the library proper.

It has from the outset been the policy of the University, while providing adequately for the symmetrical growth of the library, to

acquire the richer private collections of books which eminent scholars have built up, through a lifetime of study, as their tools of research. Thus, for the study of Oriental history, Cornell has been endowed with the Eisenlohr collection on the history of Egypt and that of President White on the history of Palestine. For the study of the Greco-Roman world it acquired that of Charles Anthon. For the Middle Ages it has notable bodies of books on the birth of the Papal state, on the rise of the Carolingian empire, and, in general, on the relations of Church and State. For the Renaissance it can boast the unrivaled Fiske collections on Dante and Petrarch and the world of their time. For the age of the Reformation, for the history of superstition and persecution (notably for Inquisition and Index, for the story of witchcraft, for the beginnings of the sciences, for the rise of tolerance), it is equipped with the riches of the President White Library; and for the study of the French Revolution that library has no equal on this side of the Atlantic, if anywhere outside France. For the history of America, the University possesses the library of the historian Jared Sparks, with the May collection on American slavery, and the White collection on the Civil War. Professor Goldwin Smith enriched it with his working library of English history; it obtained that of Professor Tuttle on Prussia; from Professor Fiske came one singularly complete on Iceland. In a multitude of narrower fields it has been found possible to gather for the special student materials for a yet more exhaustive research. Many of these collections are endowed with special funds for their increase; and all have been steadily built up with an eye to the needs of the ripper student of history.

Two fellowships and a graduate scholarship are annually awarded to students of history. The President White Fellowship in Modern European History has a value of \$600. It may be granted as a traveling fellowship. The Fellowship in American History amounts to \$500. The Graduate Scholarship in History amounts to \$300. There are five assistantships in history, which are filled preferably by the appointment of graduate students.

The teachers and graduate students of history have formed a History Club, which meets once a month for the reading and discussion of papers on historical topics and for social intercourse.

The following courses of instruction are of especial interest to graduate students:

History of Africa. Professor SCHMIDT.

[**History of Asia.** Professor SCHMIDT.]

Greek History in the Fifth and the Fourth Century. First term. Professor SILL.

Alexander the Great and His Successors. Second term. Professor SILL.

Problems in Roman History. Professor SILL.

[**The Roman Empire.** Professor SILL.]

[**Roman Law.** Professor SILL.]

Seminary in Greek and Roman History. Professor SILL.

The Age of Renaissance and Reformation. Professor BURR.

The Rise of Tolerance. Professor BURR.

[**Canon Law.** Professor BURR.]

Medieval Life. Subject of study in 1910-11: the Chronicle of Vitodurnus (John of Winterthur, 1273-1348). Professor BURR.

Seminary in Medieval History. Topic for 1910-11: Church and State in the Early 14th Century. Professor BURR.

Modern European History, 1600-1815. Professor CATTERALL.

[**The French Revolution.** Professor CATTERALL.]

Italy in the 19th Century. Professor CATTERALL.

[**Germany in the 19th Century.** Professor CATTERALL.]

Seminary in Modern European History. Professor CATTERALL.

Constitutional History of the United States from 1787 to 1846. First term. Assistant Professor BRETZ.

Constitutional History of the United States from 1846 to 1877. Second term. Assistant Professor BRETZ.

Constitutional History of the Colonies and States, to 1780. Second term. Professor HULL.

Topics in American Social History. First term. Assistant Professor BRETZ.

Seminary in American History. Professors HULL and BRETZ.

[**The Sciences Auxiliary to History.** Professor BURR.]

[**Historical Geography.** Professor BURR.]

Palaeography and Diplomatics. Professor BURR.

Introduction to the Literature of History. A general survey, period by period, of the sources and literature of history. Professors SILL, SCHMIDT, BURR, CATTERALL, HULL, and Assistant Professor BRETZ.

Historical Method. History: its nature, its scope, its materials, its methods. First term. Professor BURR.

The Teaching of History. Second term. Professor BURR, with aid from his colleagues.

Political Science.

The Political Science group in the President White School of History and Political Science consists of four departments, each of which treats a portion of the subject of economics and cultivates in addition some one division of political science.

These departments aim to bring their work into close relationship with social, political, and business life. The members of the faculty seek to keep in touch with the practical as well as the purely scientific aspects of the problems treated, and have among other objects the preparation of students for positions in business and public service.

In the department of economics and politics many theses for the doctor's degree, such as that on the Committee System and that on the Judicial Work of the Comptroller of the Treasury, have dealt with the actual routine work of politics or administration; others, like that on the Street Railways of New York City, have examined the relations between certain lines of business and politics; and others, like that on the Finances of New York City, have dealt historically with administrative work.

Under the department of economics and statistics work is offered mainly in statistics but to some degree also in the less definite field of social science. The statistical method has been found of especial service, both in developing a scientific and judicial attitude, and in bringing out many facts about social life not discoverable in any other way.

In the department of economics and distribution a number of courses are offered dealing with modern efforts for social betterment. A course for graduates only deals with important contributions of contemporary economists to the theory of distribution, which in some form underlies every project of social reform. Other courses treat of the legal and economic aspects of the labor problem, the projects of industrial insurance, arbitration, etc.; the history, theory, and present position of the socialist parties; and of criminology and charity, especially in relation to the welfare of the masses.

In the department of economics and finance courses are offered dealing with money and banking, public finance, corporate finance, accounting, and insurance. Especial attention is given to the subjects of currency, taxation, and corporate finance. In 1910-1911 a graduate course will be devoted to the subject of proposals for a central bank for the United States in the light of European experience.

The departments have recently been provided with two laboratories and two class rooms on the second floor of Goldwin Smith Hall in close proximity to each other and to the four department offices and one general office, an arrangement which has greatly facilitated intercourse between teachers and graduate students as well as of graduate students among themselves. At the department offices numerous publications in politics and in economic legislation and business, such as market letters of leading brokers and technical business journals are accessible to advanced students. Two laboratories for classes in statistics, finance, and charities are supplied not only with standard and current books dealing with these subjects but also with various mechanical devices for simple statistical processes and for securing a graphic and effective presentation of results. A selected series of lantern slides illustrate the social and economic conditions underlying various forms of political organization, the racial types of mankind and their distribution, the nature and relations of many statistical or monetary phenomena, the problems of philanthropy and crime.

Candidates for advanced degrees should have or acquire at once a reading knowledge of at least two foreign languages, preferably French and German, and should have had courses in economics, social science, and political institutions.

Two assistantships yielding \$150 and tuition, three fellowships, two yielding \$500 and one yielding \$600, and one teaching assistantship yielding \$500 and tuition are filled each spring.

The following courses are offered for graduate students:

77b. **History and Theory of Statistics.** Open to graduate students and to others who have already had a course in statistics at Cornell University or elsewhere. First term. M., W., 10, Goldwin Smith 259. Professor WILLCOX.

80. **The Modern Theory of Distribution.** A study of the most notable recent writings and contributions to systematic economics and of the methods of the modern critical school. First term. W., F., 8. Professor FETTER.

[82. **The Principles of Politics.** Study of fundamental questions covering the nature of society and its principles of organization, and especially the nature of the state, its functions and the principles of its practical organization. Once a week. Professor JENKS.]

[83. **The Practice of Politics.** The principles of politics as exemplified in the governments of the United States—federal, state, and local. The methods followed in this country in legislative, executive, and judicial work will be considered, compared with those of other countries. Once a week. Professor JENKS.]

84. **Special Problems in Politics.** Consideration of a few fundamental questions, legislative and administrative, that are of especial interest to those studying political reforms. Once a week. T., 4 Professor JENKS.

89. **Currency and Banking Reform in the United States.** A study of proposals for a central bank for the United States in the light of European experience. One two hour session each week. Professor KEMMERER.

90. **Research in Labor Problems.** Research in connection with laboratory exercise. One to three hours a week. Professor FETTER.

92. **Research in Finance.** Professor KEMMERER.

94. **Research in Politics and in the Economic History of the United States.** Professor JENKS.

96. **Research in Statistics.** Professor WILLCOX.

98. **Research in Philanthropy.** Professor FETTER.

99. **General Seminary.** For research work in the field of political science. M., 2:30. Professors JENKS, WILLCOX, FETTER, and KEMMERER.

MATHEMATICS.

Professors: JAMES McMAHON; J. H. TANNER; J. I. HUTCHINSON; VIRGIL SNYDER; F. R. SHARPE; W. B. CARVER; ARTHUR RANUM.

Instructors: D. C. GILLESPIE; C. F. CRAIG; F. W. OWENS; J. V. MCKELVEY; L. L. SILVERMAN; W. A. HURWITZ; E. J. MILES.

The graduate work in mathematics provides instruction in its principal branches and furnishes preparation and material for independent investigation. While but a portion of the whole field can be covered by the courses given at one time, these are changed from year to year in order to meet the needs of the students.

In addition to the regular instruction, individual guidance and advice are offered to any student who wishes to follow a particular line of inquiry.

The department is provided with a collection of about three hundred models, including :

Plaster models of the quadric and cubic surfaces, of several forms of the Kummer surface, of the cyclides, of surfaces of centers of quadrics, and of minimum surfaces.

Plaster models illustrating positive, negative, and parabolic curvature, and constant measure of curvature.

Plaster models illustrating the theory of functions; among them models of simply and multiply connected surfaces and of several forms of Riemann's surfaces, and models representing the real parts of algebraic, exponential, logarithmic, and elliptic functions.

Wooden and glass models of crystals and polyhedra.

Wire and thread models of twisted curves and ruled surfaces, and skeleton frames for minimum surfaces.

The University Library has a large collection of books on pure and applied mathematics, including collected works of mathematicians, complete sets of all the important mathematical journals, transactions and other publications of scientific societies, and doctoral theses from the leading American and European universities.

The Oliver Mathematical Club, composed of teachers and advanced students, meets weekly and has for its object the systematic presentation, by the members, of some specified mathematical theory of recent development, and of reports on noteworthy articles in current journals and on the results of special reading and investigation.

The following courses will be offered during the year 1910-1911:

11. **Differential Equations.** An elementary course including the solution of the simpler types of ordinary and partial differential equations. Special attention is given to the statement of physical problems in the form of differential equations and the applications of boundary conditions to the solutions found. M., W., 9. Dr. OWENS.

12. **Applied Mathematics.** An elementary study of some of the more important functions connected with the differential equations of mathematical physics, including graphical representation and processes of numerical approximation. Some knowledge of mechanics and of differential equations is presupposed. Two hours. Dr. CRAIG.

13. **Descriptive and Projective Geometry.** Ordinary problems of descriptive geometry and their application to synthetic and general projective geometry. The principal aim of the course is to familiarize the student with reasoning about geometric forms. M., W., F., Assistant Professor SNYDER.

14. **Theory of Probabilities** with applications to insurance and sociology. Fitting of approximation curves to statistical data and investment rates. Two hours. Professor McMAHON.

15. **Advanced Analytic Geometry.** An introduction to the theory of algebraic curves and surfaces. Systems of co-ordinates, ele-

mentary transformations, polar systems, unicursal curves and of the theory of quadric surfaces. Three hours. Dr. McKELVEY.

16. **Theory of Equations.** Symmetric functions, transformations and general properties of equations; a detailed discussion of cubic, quartic, and binomial equations; approximate solutions of numerical algebraic and transcendental equations; general theory of elimination; determinants. Two hours. Professor TANNER.

17. **Advanced Calculus.** Besides the usual topics, the course will include a study of the essential nature of the problems of the differential and integral calculus and of the limitations within which the processes may be applied. Three hours. Assistant Professor CARVER.

[18. **Infinite Series and Products.** To be given in 1911-1912.]

[19. **Algebraic Curves.** To be given in 1911-1912.]

19b. **Birational Transformations.** A study of Cremona and Riemann transformations in the plane, with illustrations in space. Two hours for one term. Assistant Professor SNYDER.

22. **Theory of Groups.** The fundamental principles of the theory of abstract groups of finite order; permutation and linear groups; the Galois theory of algebraic equations. Two hours. Assistant Professor RANUM.

24. **Differential Geometry.** An elementary course in the applications of the calculus to the geometry of surfaces. Applicability and systems of curves on surfaces; asymptotic lines, lines of curvature, geodesies, and isothermals. Three hours. Dr. GILLESPIE.

25. **Theory of functions of a Complex Variable.** A general course in the theory of functions with especial attention to uniform and algebraic functions, and conformal representation; some of the elementary properties of functions of several variables will also be considered. Three hours. Assistant Professor HUTCHINSON.

27. **Algebra of Logic.** Boole's Laws of Thought; recent developments by Veun, Schröder, and Peano; Russell's Principles of Mathematics. The course requires no technical knowledge of mathematics, and is open to students of mathematics or of philosophy. Three hours for one term. Mr. SILVERMAN.

28. **Calculus of Variations.** (1) The treatment of the case in which the integrand contains one unknown function and its first derivative and one independent variable; (2) an introduction to mechanics from the standpoint of the calculus of variations. Two hours. Dr. GILLESPIE.

29. **Elementary Mechanics.** A simple exposition of the fundamental principles of the subject to meet the needs of students who

do not intend to specialize in mathematics or in physics. Two hours. Assistant Professor SHARPE.

30. **Vector Analysis.** Classification of vector fields; illustrations and properties of the principle fields; applications to electric fields. Two hours. Professor McMAHON.

[42. **Advanced Course in Mathematical Physics.** To be given in 1911-1912.]

PHYSICS.

Professors: E. L. NICHOLS; ERNEST MERRITT; FREDERICK BEDELL; J. E. TREVOR; J. S. SHEARER; G. S. MOLER; ERNEST BLAKER.

Instructors: H. G. DORSEY; C. A. PIERCE; W. J. FISHER; F. K. RICHTMYER; R. C. GIBBS; R. C. RODGERS; A. A. SOMERVILLE; A. S. GALAJIKIAN; H. E. HOWE; H. O. TAYLOR; C. C. MURDOCK; F. A. MOLBY; G. W. NASMYTH.

The department of Physics offers opportunities for study and investigation in theoretical physics and in various experimental branches of the science.

The facilities for radiometric and spectrophotometric work; for the investigation of the properties of matter throughout a very wide range of temperatures; in the application of photographic methods to problems in experimental physics; and in electricity, especially for the study of alternating current phenomena, etc., are exceptionally good.

Some forty individual rooms in Rockefeller Hall are set aside for advanced workers. Research is organized as a distinct sub-department with its own equipment, stock and apparatus room, well-equipped work-shop for the use of graduate students, complete appliances for the production and handling of gases, including generators, low and high pressure storage tanks, compressors and power driven vacuum pumps, etc. An instrument-maker's shop with two mechanics is employed solely in the construction and repair of apparatus.

During the year 1910-11 Professor NICHOLS will direct the work of graduate students in experimental physics and particularly in radiation and luminescence; Professor MERRITT in theoretical and experimental physics, particularly in electricity and magnetism and problems connected with luminescence; Professor BEDELL in

applied electricity, theoretical and experimental, and particularly in alternating current phenomena. Professor SHEARER in theoretical and experimental physics and particularly in work requiring the production and measurement of high and low temperatures. Professor TREVOR in the theory of thermodynamics. Professor MOLER in work involving the use of photography; Professor BLAKER in Sound and Illumination.

The following specified courses are available to graduate students selecting physics as a minor subject:

14. **Physical Experiments.** One to eight hours (available only for students not selecting physics as a major subject). Assistant Professor BLAKER, Messrs. RICHTMYER, FISHER, DORSEY, NASMYTH, MOLBY, RODGERS, GALADJIKIAN and TAYLOR.

20. [**Heat.** First term. T., Th., S., 9. Assistant Professor BLAKER. Not given in 1910-11.]

21. **Light.** First term. T., Th., S., 9. Assistant Professor BLAKER.

22. [**Electricity and Magnetism.** Second term. [Assistant Professor BLAKER.]

23. **Properties of Matter.** Second term. T., Th., S., 9. Assistant Professor BLAKER.

25. **Advanced Laboratory Practice.** A laboratory course in general physics for students who have completed the usual undergraduate courses and expect to teach physics or who need further preparation for research. Two to six hours. Assistant Professor BLAKER.

19. **Advanced Photography.** with special reference to its application to research. Two hours. Laboratory practice. Assistant Professor MOLER.

33. **Alternating Currents.** A study of underlying principles and of the development of graphical methods of analysis, as a basis for alternating current testing and for the solution of practical problems. Two hours. Lectures, and class exercises. First term. T., Th., at 10. Professor BEDELL.

34. **Electrical Laboratory Practice.** General dynamo laboratory practice, and the testing of direct and alternating current apparatus. Three hours. Daily 9-1. Professor BEDELL and Dr. PIERCE.

35. **Advanced Course in Electrical Laboratory.** Two to eight hours. Daily 9-1. Professor BEDELL and Dr. PIERCE.

39. **Design and Construction of Apparatus for Research.** First term. Lectures and Laboratory. Two hours. Assistant Professor MOLER.

40. Recent Advances in Experimental Physics. Devoted to such of the more important developments in physics as have not yet found their way into the text-books. The lectures will be illustrated by experiments whenever the nature of the subject permits. In 1910-11 about half the time will be given to the subject of Electric Waves. F., 12. Professor MERRITT.

[41. **The Electric Transmission of Intelligence.** First term. Lectures. S., 12. Professor NICHOLS. Not given in 1910-11.]

42. Primary and Secondary Batteries. First term. Lectures, S., 12. Professor NICHOLS.

43. Photometry and the Physics of Illumination. Second term. Lectures. S., 12. Professor NICHOLS.

15. Photometry. A study of different light sources with reference to candle power, efficiency, and distribution; life tests of incandescent lamps; the calibration of standards of illumination. The investigation of various photometers and illuminometers. One to four hours. Assistant Professor BLAKER and Mr. RICHTMYER.

[46. **Light.** Three exercises a week based on Drude's Theory of light. One experimental lecture a week by members of the class under the direction of the instructor. Professor SHEARER. Not given in 1910-11.]

47. Heat. Production of high and low temperatures; methods used in the measurement of temperature and heat; methods of heat transfer; theory of heat and molecular physics; kinetic theory of matter. Four hours. Professor SHEARER.

[48. **Reading Course** on the electro-magnetic theory of light principally from French and German texts. Professor SHEARER.]

49. The Application of Mathematics to Physics. Lectures and problems on the statement of physical concepts in mathematical form and the interpretation of results, with suggestions as to methods of computation. Two hours. Professor SHEARER.

50. Physical Seminary. Two hours. Critical reading of original memoirs relating to physics; followed in the latter part of the year by the reports upon original work done in the department. A colloquium in which all members of the teaching staff of the department, as well as graduate students of physics take an active part. Professor NICHOLS.

[51. **Theoretical Physics.** Mechanics and thermodynamics. Three hours lectures and one hour seminary throughout the year. Given in 1911-12. Professor MERRITT.]

52. Theoretical Physics. Electricity and magnetism. Three hours lectures and one hour seminary throughout the year. Professor MERRITT.

53. **Electricity and Magnetism.** Lectures and seminary. For advanced students who have completed course 52 or its equivalent. Professor MERRITT.

54. **Thermodynamics.** The meaning and scope of the general laws of thermodynamics, application of these laws in the development of the theory of thermodynamic equilibrium and stability. The treatment is mathematical in character, and presupposes a fair acquaintance with calculus. Professor TREVOR.

CHEMISTRY.

Professors: L. M. DENNIS, Inorganic Chemistry; W. R. ORNDORFF, Organic and Physiological Chemistry; W. D. BANCROFT, Physical Chemistry; E. M. CHAMOT, Sanitary Chemistry and Toxicology; G. W. CAVANAUGH, Agricultural Chemistry; A. W. BROWNE, Inorganic and Analytical Chemistry.

Instructors: G. R. WHITE, H. W. REDFIELD, G. E. F. LUNDELL, F. F. SHETTERLY, E. H. NICHOLS, T. W. B. WELSH, B. J. LEMON, L. J. CROSS, C. C. HEDGES.

The chemical laboratory, Morse Hall, consists of two connected buildings, with floor space of over 74,000 square feet. In addition to laboratories and lecture rooms for undergraduate work there are two rooms for organic chemistry, a special laboratory for the microchemical analysis, two for bacteriological work in connection with the analysis of water and foods, one room for distillation in water and food analysis, three rooms for assaying, two for gas analysis, a fire-proof room for work with highly inflammable substances, a laboratory for combustion analysis, a hydrogen sulphide room connected with strong fan exhaust, an electric furnace laboratory, a large room for advanced inorganic chemistry, a room for spectroscopic chemical analysis, a large laboratory for elementary work in physical chemistry, one for electrochemistry, one for advanced work in agricultural chemistry, and a number of rooms devoted exclusively to research. Distilled water is conducted in block tin pipes to all the more important rooms on each floor from a tin-lined tank in the upper story of each building. Air blast is conducted wherever required from a high pressure blower in the basement. The buildings are supplied with an alternating current at 2200 volts and with two direct current circuits at 500 and 110 volts. Currents for electrochemical analysis and synthesis are furnished by storage batteries. With the aid of a motor generator, low voltage direct currents up to 2000 amperes may be obtained,

The chemical library contains complete sets of the more important journals, and is fully supplied with works of reference and with the standard books on chemistry and allied subjects.

A graduate student who desires to take either a major or a minor subject in chemistry may select any one of the following six branches: inorganic chemistry, analytical chemistry, organic chemistry, physical chemistry, sanitary chemistry, agricultural chemistry. Under the present procedure both the major subject and the one minor subject required for the degree of Master of Arts or the major subject and the two minor subjects required for the degree of Doctor of Philosophy may be selected from the six divisions mentioned above, but it is desirable that candidates for the degree of Doctor of Philosophy select at least one minor subject outside of the Department of Chemistry.

A graduate student who desires to take a minor subject in chemistry with the major subject in some department other than that of chemistry will be required to offer introductory inorganic chemistry and elementary qualitative and quantitative analysis as preliminary to his graduate work in chemistry. The work upon his minor subject in chemistry may be taken in any branch of the subject that he is qualified to pursue. Candidates for the degree of Master of Arts or for that of Doctor of Philosophy with the major subject in chemistry will be expected to have a reading knowledge of French and German and will be required to offer as preliminary to their graduate work in chemistry the following subjects: introductory inorganic chemistry, elementary qualitative and quantitative analysis, advanced quantitative analysis, spectroscopic chemical analysis, gas analysis, elementary organic chemistry, microchemical methods, and elementary physical chemistry. Courses in these subjects, if taken in another university, should be substantially equivalent to the courses offered in this Department. Graduate students entering from other universities may take during their residence for the advanced degree such of the above courses as they have not already pursued. If a graduate student lacks at entrance several of these preliminary courses longer residence may be necessary.

The following courses, which are described in detail in the courses of instruction of the College of Arts and Sciences of Cornell University, may be taken in partial fulfillment of the requirements for an advanced degree.

14. Quantitative Analysis. Advanced course. Either term. Laboratory practice at hours to be arranged. Dr. LUNDELL and Messrs. COTMAN and MARSH.

33. **Special Chapters in Organic Chemistry.** T., Th., 9. Professor ORNDORFF.

34. **Advanced Organic Chemistry.** Laboratory practice. Professor ORNDORFF and Mr. NICHOLS.

35. **The Coal Tar Dyestuffs.** Th., 12. First term. Professor ORNDORFF.

36. **Stereochemistry.** Th., 12. Second term. Professor ORNDORFF.

37. **Methods of Organic Analysis.** Laboratory practice. Professor ORNDORFF and Mr. NICHOLS.

46. **Inorganic Chemistry.** Advanced course. T., Th., 11. Professor DENNIS and Assistant Professor BROWNE.

47. **Inorganic Chemistry.** Laboratory practice. Professor DENNIS and Mr. FREAR.

48. **Selected Topics in Advanced Inorganic Chemistry.** Th., 11. First term. Professor DENNIS and Assistant Professor BROWNE.

52. **Advanced Physical Chemistry.** M., W., F., 10. Professor BANCROFT.

53. **Colloid Chemistry and Photochemistry.** M., W., F., 10. Second term. Professor BANCROFT.

55. **Theoretical Electrochemistry.** T., Th., 10. Professor BANCROFT.

56. **Applied Electrochemistry.** Lectures and laboratory practice. Professor BANCROFT. Mr. GILLET and Mr. PEREY.

57. **Advanced Laboratory Practice.** Professor BANCROFT and Mr. RATHJEN.

66. **Microchemical Analysis.** Elementary course. Three hours. First term. Assistant Professor CHAMOT and Mr. LOCKHART.

67. **Microchemical Analysis.** Advanced course. Second term. Assistant Professor CHAMOT.

70. **Foods, Beverages, and Food Accessories.** T., Th., 11. First term. Assistant Professor CHAMOT.

71. **Food Analysis.** Four hours. First term. Assistant Professor CHAMOT and Mr. REDFIELD.

72. **Microscopical Examination of Foods.** Two hours or more. Second term. Assistant Professor CHAMOT.

75. **Potable Water.** T., Th., Second term. Assistant Professor CHAMOT.

76. **Water Analysis.** Three hours. Second term. Assistant Professor CHAMOT, Mr. REDFIELD and Mr. RATHJEN.

80. **Toxicology.** W., F., 12. First term. Assistant Professor CHAMOT.

81. **Toxicology.** Three hours. First term. Laboratory practice. Assistant Professor CHAMOT.

86. **Agricultural Chemistry, Advanced Course.** W., F., 8. Second term. Lectures. Professor CAVANAUGH.

87. **Agricultural Analysis.** First term. Laboratory practice. Professor CAVANAUGH and Mr. CROSS.

88. **Agricultural Analysis.** Second term. Laboratory practice. Professor CAVANAUGH and Mr. CROSS.

89. **Dairy Chemistry.** T., Th., 9. Second term. Professor CAVANAUGH.

90. **Advanced Agricultural Analysis.** Professor CAVANAUGH.

GEOLOGY.

Professors: R. S. TARR, Physical Geography; H. S. WILLIAMS, Geology; HEINRICH RIES, Economic Geology; G. D. HARRIS, Paleontology and Stratigraphic Geology; A. C. GILL, Mineralogy and Petrography.

Instructors: O. D. VONENGELN, Physical Geography; C. A. STEWART, Geology; IRVING PERRINE, Geology; J. L. RICH, Physical Geography; S. L. GALPIN, Geology and Mineralogy; W. E. HOPPER, Geology and Physical Geography; DONALD STEEL, Economic Geology;

Under the general title of Geology are included Crystallography, Dynamic Geology, Economic Geology, Mineralogy, Paleontology, Petrography, Physical Geography and Stratigraphic Geology.

Mineralogy, Crystallography, and Petrography. The laboratory equipment is especially good as regards petrographic microscopes, apparatus for chemical and physical investigation of rocks and apparatus for special crystallographic determinations. There are also some considerable collections of rocks and study collections of minerals. The largest of the latter includes the Benjamin Silliman, Jr., Mineral Collection.

Special graduate courses are not offered but advanced work is adapted to the needs of the individual. Two of the elementary courses are, however, so dependent on a rather advanced knowledge of physics, or chemistry, or both, that they are to be considered as requiring the maturity of graduates, although open also to undergraduates with sufficient preparation. They are accepted in part fulfillment of the requirements for an advanced degree. These two courses are 14, Physical Crystallography; and 15, Petrography.

Physical Geography. The region round about Ithaca abounds in excellent and varied illustrations of physiography, glaciology, and dynamic geology, and consequently abundant opportunity is offered for research work. Besides field work near the University, expeditions are undertaken annually to more distant points, for example, Niagara Falls.

In addition to field work, there are excellent facilities for indoor work. The main laboratory is well equipped with topographic maps and photographs; the collection of relief models is notably complete, and there is an experimental laboratory with apparatus and facilities for carrying on a variety of experiments in the development of land forms, etc. In the laboratory is a special library of reference works on geographic subjects.

The advanced courses announced below serve as a basis for graduate work in Physical Geography and are distinctly professional in nature. For admission to them it is required that the student have a working knowledge of the fundamental principles of the subject and have completed some reading other than text books. These courses serve in the training of students for positions in the better grade of secondary and normal schools; in colleges and universities; in the national geological survey; in exploring expeditions; and for research work.

Economic Geology. The work in Economic Geology is designed to familiarize the student with the origin, occurrence, and distribution of the mineral products of economic value, and also the practical application of geologic principles. The laboratory contains an excellent study collection of economic materials, from the United States, Canada, Mexico, and Europe, including ores, fuels, clays, abrasives, building stones, etc., most of these representing suites of material collected by members of the department on geological trips. This collection is supplemented by maps and models. The department library contains a number of reports and books on economic geology; and the University Library has an especially full set of works covering this special field.

In addition to the collections, the economic geology laboratory has facilities for general and research work on economic materials, the equipment for clay investigation being especially large.

The work of graduate instruction consists in part of lectures and in part of special work arranged to suit the needs of the individual student. Those students registered for a major subject in economic geology are expected to do research work, which should preferably be based on field work.

Excursions may readily be taken to the anthracite region of Pennsylvania; the iron, slate, cement and talc region near Easton, Pa.; the magnetite mines of the Adirondacks, etc. Field trips of greater or less length are taken to some of these localities every year.

Paleontology and Stratigraphic Geology. The University is situated in the center of fine exposures of Devonian rocks covering the southern half of the state. In addition to the classical work done by Hall and others in descriptive paleontology for the state, recent work of an intensive kind in elaborating the range and distribution of fossils has been carried on with Cornell University as a center and with aid of the United States Geological survey, culminating in the preparation of the Watkins Glen-Catatonk folio, in which for the first time the principles of determining horizons by fossils have been rigidly applied. In the course of preparation of this folio particular attention was given to making full collections of fossils from each zone; numerous generic series are thus provided awaiting elaboration. In the course of this work faunal paleontology with the problems of shifting and recurrence of faunas has opened the way for the study of the larger problems of diastrophism and paleogeography. The place and the time are thus both favorable for earnest students to find here the facilities for important research in the fields of Evolutional Paleontology.

Particular facilities are offered for the application of biometric methods to the interpretation of the evolutionary laws of ancient organisms for which a large amount of Devonian material is now ready for investigation.

In this field fossils will be investigated in their relations to time and the various problems of evolution, as means for determining and correlating geological formations and reconstructing ancient geographical conditions of the earth's surface.

Facilities for those prepared to do research work in Paleontology and Stratigraphic Geology are also furnished (1) by the results of four summer expeditions from the University into the Tertiary areas of the Union; eleven seasons' work in Louisiana, two in Arkansas, two in Texas, one in Europe; (2) by the results of numerous exchanges; (3) by the Newcomb collection (10,000 species) of recent shells; and (4) by the exceptional wealth of conchological literature in the geological and general library. In the department is published the journal *Bulletins of American Paleontology*, which is the only paleontological journal in the country.

The following courses may be taken by graduate students in partial fulfilment of the requirements for an advanced degree.

4. **Physiography of the Lands.** A study of the forms of the land by means of lectures, discussion, supplementary reading, field excursions, and laboratory work. Specially planned to meet the needs of prospective teachers of physical geography in the schools. Lectures, T., Th., 9. Laboratory work W., 2-4:30. Professor TARR and Mr. VON ENGELN.

7. **Glacial Geology.** A study of living glaciers and the effects of former periods of glaciation. One lecture a week and one excursion a week, besides two longer excursions to more distant points. In the winter the laboratory period will be devoted to reading, conferences, and discussions of special topics. Second term. M., 10, and Th., 2-4:30. Professor TARR and Mr. RICH.

8. **Physiographic Relationships.** The influence of Physiography on human affairs. Each student will study specific illustrations, and present the results to the class. Weekly conferences and discussions on the progress of the work. M., 11-12. Professor TARR.

9. **Experimental Physiography.** Experiments by the individual students upon the origin and development of land forms. Professor TARR and Mr. VON ENGELN.

11. **Seminary in Physiography.** Preparation and reading of reports upon special subjects, particularly upon investigations in the field. Abstracts and discussions of the current physiographic literature. M., 4:30-6. Professor TARR.

12. **Physiographic Investigation.** Field and laboratory work with reading, conferences, excursions, and the presentation of reports. Original investigation based upon field work. Professor TARR.

14. **Physical Crystallography.** Especial attention is paid to the optical properties of crystals. First term. Three hours. Two lectures and one laboratory hour. Assistant Professor GILL.

15. **Petrography.** Second term. Assistant Professor GILL.

16. **Seminary in Mineralogy and Crystallography.** One hour. Devoted to the study of current literature and some of the more important classic writings. Assistant Professor GILL.

17. **Advanced or Special Work in Mineralogy and Petrography.** Adapted to the needs of the individual student. The work may be directed in the line of crystallographic measurements, crystal structure, mineral synthesis, micro-chemical methods, or petrographic research. Assistant Professor GILL.

22. **Historical Geology.** Second term. W., F., 9. Laboratory to be arranged. Professor HARRIS.

24. **Geological Conference and Special Research.** Stratigraphic and paleontologic research. Professor HARRIS.

28. **Invertebrate Paleontology.** The structure, mode of occurrence, geological range, and geographical distribution of fossil organisms and their uses in determining time horizons and correlating geological formations. Chiefly laboratory work. Professor WILLIAMS.

32. **General Economic Geology.** The origin, nature, and distribution of the metallic and non-metallic products, with special reference to those of the United States. A portion of the laboratory work may be replaced by field trips to quarry and mining regions. (a) Lectures. M., W., 10. (b) Laboratory. M., or T., 2-4. Professor RIES and Mr. STEWART.

33. **The Examination of Mineral Deposits.** Second term. Two hours. Professor RIES.

35. **Clay Investigation.** Laboratory work, field work, and reading. In the laboratory are taught the different methods for testing clays for the purpose of determining their uses. Professor RIES.

36. **Advanced Economic Geology.** Professor RIES.

2. **Geological Seminary.** Abstracts and discussions of the current literature on economic geology, and preparation of papers on special subjects. Professor RIES.

BOTANY.

Professors: G. F. ATKINSON, W. W. ROWLEE.

Instructors: E. J. DURAND, H. B. BROWN.

The Department of Botany occupies the south wing of Sage College. The laboratories for advanced and research work are well supplied with apparatus and materials in the way of microscopes, microtomes, ovens, sterilizers, thermostats, waterbaths, cameras for photographic and photomicrographic work, culture rooms, electric lantern, etc. The laboratories are directly connected with well equipped and well stocked greenhouses. These contain a large assortment of exotic plants, which afford material for illustration and comparison, as well material for investigation. The greenhouses also afford space for experimental work in plant physiology and morphology, and for the growing of plants under observation. There are excellent facilities for field work in connection with research in the vicinity of the University.

The University Library is well supplied with the more important periodicals and complete sets of journals relating to botanical science, and a large collection of special works devoted to the various subdivisions of the science, as morphology, histology, physiology, and the different systematic subdivisions. The works most frequently required for reference are kept in a department library.

The botanical seminaries offer opportunity for keeping in touch with the current literature of the subject, and of dealing with the theoretical and practical aspects of the various problems under investigation in the department.

Below are given the courses which prepare for and supplement special lines of research, and which may fulfill in part the requirements for an advanced degree.

7. Taxonomy and Phylogeny of Angiosperms. The genetic relationships of the phanerogamous orders; practical studies in the laboratory of groups illustrating the principles of natural classification. Wednesday afternoon and Thursday morning. Lecture, Th., 9. Professor ROWLEE

8. Comparative Histology of Plants. Introduction to methods of investigation; studies of the vegetable cell, its multiplication and contents; the development of primary tissue; kinds of tissue; comparative study of vascular tissue; secondary thickening. Lectures, F., 9. Laboratory work, Friday afternoon and Saturday morning. Professor ROWLEE and Mr. BROWN.

9. Dendrology. A biological and taxonomic study of trees, including field observations upon the native species, and laboratory investigations upon the structure and development of woody structures. Lectures, T., 9. Laboratory and field work, Monday afternoon and Tuesday morning. Professor ROWLEE and Mr. MOORE.

10. Comparative Morphology and Embryology. A study of representative groups which illustrate the line of evolution of green plants; the development and homologies of sporogenous, reproductive, and embryological organs, with discussions of the principal plant phylae. Permanent microscopic preparations will be made, representing series of liverworts, mosses, ferns, gymnosperms, and angiosperms. Lectures, Th., 12. Laboratory work Monday and Wednesday afternoons. Dr. DURAND.

11. Mycology. General classification, development, and plant pathology as a basis for research. Studies of the representative genera of basidiomycetes, with special attention to the structure and characters of edible and poisonous mushrooms and wood-

destroying and parasitic species; the history and development of the most important parasitic fungi, ustilagineae, uredineae, ascomycetes and phycomycetes. Lectures, T., Th., 11. Laboratory work, Monday and Wednesday afternoons. Professor ATKINSON and Mr. BARRETT.

21. Taxonomy of the Pteridophytes, Bryophytes, and Algae. A study of typical genera, practice in taxonomy, and field work. Lecture, F., 11. Laboratory work, Friday afternoon and Saturday morning. Dr. DURAND.

13. Methods of Research in Morphology and Embryology. Research problems in sporogeny or embryology, and the morphology of the nucleus with reference to sporogenesis, spermatogenesis, oogenesis, and fertilization, in the algae, liverworts, mosses, ferns or seed plants; or some problem in experimental morphology. Should follow course 10, but in special cases may be taken as a parallel study. Hours by appointment. Professor ATKINSON and Dr. DURAND.

14. Methods of Research in Mycology. Special problems. Independent survey of the group of fungi in the collection of material, and general taxonomic work on the same; research in some problem in taxonomy, or in a development of a few species, or in plant pathology. Professor ATKINSON and Mr. BARRETT.

15. Plant Physiology. Not less than four hours, and when chosen as a major subject, more time will be required. Hours by appointment. Professor ATKINSON.

16. Research in Taxonomy and Phylogeny of the Angiosperms. Four or more hours. A comparative study of the organs of taxonomic value, and also their development. Among the groups which may be taken are the glume bearing monocotyledons (grasses, sedges, etc.) the amentiferous dicotyledons, and the compositae. Since different groups will be taken up in different years, students may pursue the course more than one year. Professor ROWLEE.

17. Research in Comparative Histology and Cytology. Not less than four hours. Special problems. The comparative histology of a series of organs, or the anatomy of an individual plant; the biology and structure of starch, plastids, and other cell contents; nuclear division and cell formation, with special reference to tissue development. Professor ROWLEE and Mr. BROWN.

PLANT PHYSIOLOGY.**Professor B. M. DUGGAR.****Instructors LEWIS KNUDSON.**

The Department of Plant Physiology occupies laboratories and offices on the first floor of the Agronomy Building, College of Agriculture. The laboratories are equipped with the apparatus required in instruction, and with much that may be needed in research. The routine work of the department is done in one general laboratory, provided with the necessary facilities for the study of the microscopic, the chemical, and the physical aspects of this subject. This laboratory is subdivided so that special light and other facilities are provided in one portion for cytological work.

The usual microscopic outfits, lockers, and apparatus required in general physiology and cytology are provided. A considerable amount of space is devoted to chemical tables, including work tables, titration stands, nitrogen still, reagent and glassware cases, hoods, etc. The department is also equipped with good balances, with one MacKenzie automatic balance for rapidly weighing cultures where transpiration data are taken, recording hygrometers and thermometers, a culture room, steam sterilizers, autoclaves, and with all small apparatus necessary.

Graduate students are assigned desks in a separate room, which serves as headquarters for their supplies and records.

In the new green-houses, now nearing completion, there will be provided, at the outset, one green-house 25 x 50 ft., and head-house space 24 x 50 ft.—one half of which will constitute a supplementary laboratory for the preparation of cultures by graduate students. The books which are most frequently consulted in advanced work are available within the department.

Special effort has been made to give opportunities for individual investigation, particularly in such phases of the work as nutrition, the relation of plants to climatological and other factors of the environment, the course of bacterial fermentation, effects of external agencies in heredity, and cell physiology.

The seminars offer to graduate students an opportunity to become familiar with current work in plant physiology and to consider the relation of such work to agricultural practices. These meetings are taken advantage of for general conferences and for the discussion of opinions or methods not conveniently or appropriately dealt with in the general courses. All graduate students are required to take part in the work of the seminary and to gain experience

in presenting the results of their own research work, or in developing opinions respecting the work of others.

It is not possible to state definitely the best type of special preparation for those intending to pursue graduate work in this subject. On the one hand special training in botany or chemistry may be regarded as the best preparation, yet if the future application of the subject is considered, it is evident that special training in horticultural or agronomic lines is requisite in addition to good fundamental knowledge.

The courses in plant physiology open to graduate students in 1910-11 are as follows:

8a and b. **General Physiology.** An advanced course requiring considerable preparation in botany and chemistry. Lectures and reports 2 hours, laboratory work 5 hours.

12a. **Cell Physiology.** A study of the activities of the cell with special reference to nuclear division of gamete production and heredity. First term. Lecture 1 hour. Laboratory 5 hours.

15b. **Physiology of Fermentation and Enzyme Action.** Second term. Lecture 1 hour. Laboratory 5 hours.

16. **Seminary in General Physiology.** Special reports required. 1 hour.

17b. **Seminary in Cytology.** Special reports required. 1 hour, second term.

18. **Research, general Physiology.** May be taken as a major or minor subject.

19. **Research, cell physiology.** May be taken as a major or minor subject

HORTICULTURE.

Professors: JOHN CRAIG; L. B. JUDSON; C. S. WILSON.

Somewhat exceptional facilities are offered for research in floriculture, olericulture, pomology, and the development of plants having economic or aesthetic value. The equipment consists of a large and steadily increasing collection of works of reference comprising a number of the rarer books of the ancients, an unusually full assortment of the garden herbals of the sixteenth, seventeenth, and eighteenth centuries, the leading monographs and manuals of modern times, supplemented by complete sets of a large number of the horticultural journals of Europe and America. Horticultural literature offers attractive opportunity for graduate Study. Students have access also to an herbarium of cultivated plants, "A garden herbarium" comprising some 13,000 plants.

Floriculture. In this division the field awaiting the investigator is extensive and practically unworked. The floricultural interests of the United States are growing very rapidly, and now surpass those of the orchard. The student who undertakes research in floriculture, while not required to devote the summer period to his investigation, may find it advantageous to do so. In addition to field areas now being extended, and 6000 square feet of glass, the division of Floriculture has recently been provided with a new range of glass aggregating some 7000 square feet. Problems in variation, nutrition, culture and improvement of plants, especially in the whole range of hardy ornamental plants, may be undertaken by the graduate student.

Olericulture. Field and forcing-house facilities in this subject, which is coordinate in commercial importance with floriculture and pomology, are being extended as rapidly as possible. The special vegetable growing sections of the state offer unique opportunities for observation and research.

Pomology. A comprehensive field laboratory in this branch of horticulture has been established at the experimental farm and is being developed rapidly.

Among the subjects which have formed the basis of theses for master's and doctor's degrees in the past, and which have appeared as Experiment Station bulletins, are orchard and soil surveys of fruit growing counties. Monographs and systematic studies on several genera of ornamental and useful plants, including *Paeonia*, *Faba*, *Lathyrus*, *Chrysanthemum* and *Dahlia* have also appeared as Experiment Station Bulletins.

In biologic investigation, the following subjects offer excellent material for research: variation of plants; influence of environment on variation; influence of artificial illuminants on plant growth; effects of etherization on germination and plant growth; methods and principles of plant propagation; influence of food on quantity and quality of pollen.

The following courses are intended primarily for advanced students and graduates:

33. **Nuciculture.** A course in this somewhat specialized field is offered to those whose work is likely to carry them south or West where nut-growing interests are assuming large importance. A systematic and practical examination of this group of food-bearing plants.

34. **Subtropical Pomology.** Designed for the student of horticulture in subtropical regions. A study of citrus

and the leading tropical fruits, with special reference to American conditions, forms the basis of this course of three hours in the first semester.

35. Literature of Horticulture and Landscape Gardening. A two-hour course given during the first semester of each year. It traces the growth of gardening and the development of horticultural ideas from the earliest records to the present time. The works of Latin, Greek and European writers are examined, and the history of the amateur and commercial eras in the New World thoroughly studied. Bibliographical methods form an important part of the course. The unusually full collection of herbals and European works of later date offer exceptional facilities for presenting this course in a satisfactory manner. Professor CRAIG.

36. Evolution of Plants. A three-hour course given in the second semester. It is required of graduate students in horticulture. The lectures discuss the historical development of the theories of evolution, their essential features, recent theories, and present-day methods of plant improvement. The garden herbarium, forcing-houses and orchards furnish material for study.

Investigation for major or minor work may be taken in the three principal divisions of the horticultural field, or in allied branches, as nature-studies, school gardening, and landscape gardening materials.

A Seminary is conducted in which all members of the instructing staff of the Department take part with advanced students.

PLANT-BREEDING.

Professors: H. J. WEBBER; A. W. GILBERT; H. H. LOVE.

The equipment of this department, including laboratory, green-houses, and gardens, is designed primarily for investigation in lines of experimental evolution. It is, however, available for the use of a limited number of graduate students.

The laboratory is well supplied with suitable microscopes, microtomes, paraffine ovens, etc., for use in histological investigations. It is also equipped with a full photographic outfit; calculating machines for the statistical study of variations; an excellent library dealing with plant-breeding and experimental evolution, and an extensive card catalogue of plant-breeding literature form a part of the equipment. The private libraries of members of the staff, containing many valuable books and pamphlets are placed at the disposal of graduate students. The department is building up an herbarium of variations of plants.

Graduate students have the use of three greenhouses, having a total floor space of 2000 square feet, for conducting investigations during the winter months. These houses are fully equipped with all necessary appliances for successful plant culture. They are divided into warm and cool houses, and certain of them have large headhouses.

Experimental Garden and Farm. A garden of three acres, of good fertility, is available for graduate students in which to grow hybrids and other plants during the summer. For more extensive plantings the department has the use of certain parts of the University Farms.

During the first year of his work the candidate for the doctor's degree is expected to spend some time on systematic reading. He is also encouraged to begin work on his minor subjects, with the expectation that the last period of study shall be devoted solely to research problem. It is expected that the student will complete his minor subjects (chosen outside of the department) during term time in order that he may spend his summers on his major subject. The completion of many problems in plant-breeding being dependent upon the number of generations of plants grown, it is very necessary that a student taking major work in this department start upon his problem during his first year of study. The development of this work will at first be slow and will therefore, allow time for the minor work and reading.

It is very desirable for students who are candidates for the doctor's degree to remain in Ithaca during the summer, since that is the best time for students in plant-breeding to carry on their work.

The following courses may be taken in partial fulfilment of the requirements for an advanced degree.

2. **Plant-Breeding.** The principles and practice of plant-breeding with reference to variation, selection, and hybridization as factors in the amelioration of cultivated plants. Special consideration will be given to the methods and results of present day plant breeders. Special lectures will be given by members of the Experimental Staff. Three hours. Lectures (2). Laboratory one period per week. Assistant Professor GILBERT.

4a. **Biometry.** Discussion and application of statistical methods as applied to problems in biology and practical breeding. Required of students whose major subject is Plant-Breeding. Laboratory one period per week. Assistant Professor LOVE.

6 Research. Problems in plant-breeding, heredity and general evolutionary topics. Special work for a few advanced graduate students. Arranged with reference to individual aims and attainments. Professor WEBBER, Assistant Professor LOVE, and Assistant Professor GILBERT.

7 Seminary. For the discussion of the fundamental problems of plant-breeding, heredity and general evolution, methods of plant-breeding, etc. Required of all graduate students in the department. Professor WEBBER, Assistant Professor LOVE, and Assistant Professor GILBERT.

PLANT PATHOLOGY.

Professors: H. H. WHETZEL, DONALD REDDICK.

The department is housed in the south end of the third floor of the Agronomy building. There is a full equipment of apparatus for carrying on graduate and research work. There are also provided a number of small, individual rooms for graduate students. The equipment includes furniture specially constructed for the particular work of the department, and the most modern types of microscopes, microtomes, sterilizers, electric incubator, and paraffine bath for the work of teaching and investigation. The phytopathological herbarium includes, besides a local collection, complete sets of a number of the well known exsiccati such as Rabenhorst, Roumeguere, Ravanel, Seymour & Earle, Fungi Columbiani, etc. Considerable space is provided in the new greenhouses, which will be devoted entirely to graduate and research work. The departmental library includes most of the important works on plant pathology, together with complete sets of the more important journals, and many monographs. The general library contains a complete collection of mycological books.

During the growing season, the department maintains a considerable number of field laboratories in the more important fruit and crop sections of the State, where members of the staff and graduate students may carry on their investigations. Each of these field laboratories has a complete equipment of apparatus and meteorological instruments necessary for the most careful type of research-work. Two industrial fellowships have been established during the past year by growers or commercial concerns, thus providing exceptional opportunities for investigation, during a continuous period, of problems of great economic importance and scientific value. These fellowships, which are worth from \$500

to \$1000 a year usually extend over a period of two years, and carry with them sums ranging from \$250 to \$500 to provide for traveling and living expenses, etc., in connection with the work in the field. These are known as temporary fellowships. The department is now in a position to offer facilities for nearly every line of work included within its field.

Besides the required courses and a thesis representing original investigation, candidates for the doctor's degree are required to spend at least one season in one of the field laboratories, so that they may come in direct contact with the conditions and the practical aspects of the control problems. They are also expected to spend some time in extension work, either at fairs or institutes, in order to get the point of view of the grower and some experience in presenting facts and conclusions. Prospective students are urged to correspond with the head of the department before coming to Ithaca.

The following courses of instruction are offered: Courses 1 and 2, or their equivalents, are prerequisites for the advanced courses. Courses 3, 4, and 9 are designed primarily for advanced, undergraduate students, but will be required of students who make plant pathology their major subject.

1. **Plant Pathology.** Nature, cause, and control of the common diseases of cultivated plants. First term. Lecture, F., 12. Laboratories in two sections: A—W., F., 2-4:30; B—Th., 2-4:30, and S., 10-12:30.

2. **Principles of Plant Disease Control.** The various methods for the control of plant diseases, including sanitation, seed treatment, seed selection, spraying, tree surgery, etc. Must be preceded by course 1. Second term. Lecture F., 12. Laboratories in two sections: A—W., F., 2-4:30; B—Th., 2-4:30, S., 10-12:30. Assistant Professor REDDICK and Professor CAVANAUGH and Assistant Professor H. W. RILEY will collaborate in this course.

3. **Laboratory Methods in Plant Pathology.** Required of all students doing advanced work. Lecture, M., 12. Professor WHETZEL and Assistant Professor REDDICK.

4. **Etiology of Plant Diseases.** The taxonomy and phylogeny of plant disease-producing organisms. Lecture, W., 12. Laboratory, M., T., 2-4:30. Professor WHETZEL and Assistant Professor REDDICK, Mr. BARRUS, and Mr. ———.

5. [Diseases of Field and Truck Crops. Given in 1911-1912.]

6. [Diseases of Fruit and Fruit Trees. Given in 1911-1912.]

7. **Diseases of Greenhouse and Florist's Crops.** First term. Conference, T., 12. Laboratories., M., T., W., 8-12. Professor WHETZEL and Mr. BARRUS.

8. **Dendropathology and Dendrosurgery.** Second term. Conference, T., 12. Laboratories, M., T., W., 8-12. Assistant Professor REDDICK and Mr. ———.

9. **Phytopathological Technique.** Laboratory practice in study of pathogenicity of organisms. Isolation, culture work, inoculation, infection, etc. Lecture, Th., 12. Laboratory 6 hours, by appointment. Professor WHETZEL and Assistant Professor REDDICK.

10. **Pathological Histology.** Types of histological modifications of plant tissues resulting from diseases: First term. Lecture, S., 9. Laboratory 6 hours, by appointment. Professor WHETZEL and Mr. ———.

11. **Research.** Professor WHETZEL and Assistant Professor REDDICK.

12. **Seminary.** Required of all graduate students. 1 hour each week throughout the year.

VERTEBRATE ZOOLOGY AND MORPHOLOGY OF THE BRAIN

Professors: B. G. WILDER; H. D. REED

Instructors: A. H. WRIGHT; A. A. ALLEN; G. C. EMBODY

The museum contains representative forms of the various vertebrate groups. In its formation efforts have been made to obtain specimens from all parts of the world illustrating biologic and evolutionary ideas. The neurologic division of the museum contains about 1900 specimens, distributed nearly as follows: Human adults and children, 500; human embryonic, fetal and at birth, 315; apes and monkeys, 235; domestic cats, 265; other mammals, 250; sharks and rays, 105; other vertebrates, 230. Among the adult human brains are twelve from well-known educated persons. There are many fetal marsupials from Australia, several entire apes, and about 150 hearts from all vertebrate classes, mostly prepared by filling the cavities with strong alcohol so as to distend them and display the parts more clearly.

Of exotic material there are representatives of nearly every family of vertebrates and, in some major groups, of most of the genera.

Of the known species, North American vertebrates (not counting subspecies) the museum now contains seventy mammals, all the ganoids and cyclostomes, one-seventh of the teleosts, one-third of the lizards, two-fifths of the birds and selachians, one-half of the salamanders, turtles and serpents, and two-thirds of the frogs and toads.

There have now been recorded from this locality sixty-five "fishes," seventeen amphibia, twenty reptiles, thirty-nine mammals, and two hundred and fifty-eight birds. The fauna is Transitional, with admixture of Austral and Canadian forms.

Within the radius of one mile are very diverse topographic conditions, the lake, the swamp, several streams, gorges, and waterfalls, hills of varying height with rocky or wooded slopes, forests and barrens.*

Among the facilities for ecologic study may be mentioned the Biological Station in the swamp at the head of the lake, and the United States Weather Bureau on the campus. The department has the most approved forms of instruments for observation and record, e. g., aneroid barometer, Draper thermograph and psychrograph, whirling hygrometers, maximum-minimum thermometers, clinometer and compass, traverse plane table, etc.

2. **Mammalian Anatomy.** Dissection of the cat, with special reference to anatomic methods. First term. Dr. WRIGHT and Mr. ALLEN.

3. **Comparative Anatomy.** A practical study of the structure of vertebrates as exemplified by representatives of the several classes. Second term. Dr. WRIGHT and Mr. EMBODY.

4. **Vertebrate Morphology and Evolution.** Lectures and demonstrations. The several systems of organs are considered with reference to their structure, development, homologies, and evolution in time. Second term. Assistant Professor REED and Dr. WRIGHT.

5. **Systematic Zoology and Ecology.** Lectures, laboratory, and field-work. The taxonomy and ecology of the vertebrate groups. In the laboratory the taxonomic characters of representative forms are studied and employed in the identification of examples. In the field the ecology of the local fauna is studied. Assistant Professor REED, Mr. ALLEN and Mr. EMBODY.

6. **Advanced Taxonomy.** Consideration of the vertebrate groups with respect to the taxonomic value of organs, geographic distribution, genetic relationships, and the principles of classification and nomenclature. (a) Ornithology. First term. 1910-1911. (b) Mammalogy. Second term. 1910-1911. (c) Ichthyology. First term, 1911-1912. (d) Herpetology. Second term. 1911-1912. Dr. WRIGHT.

*At the opening of the University in 1868 the late Professor Agassiz said:—"I was never before in a single locality where there is presented so much material in so many branches of Natural History as in this beautiful valley."

7. **Advanced Ecology and Economic Zoology.** Laboratory and field-work with collateral reading. The habits, food, life-histories, and economic importance of vertebrates. Assistant Professor REED, Dr. WRIGHT, Mr. ALLEN, and Mr. EMBODY.

8. **Morphology of the Brain.** (a) The several types of vertebrate brain, beginning with that of the acanth shark (*Squalus acanthias*); (b) the value of the brain in classification; (c) the development and morphology of the human brain; (d) its resemblances and peculiarities, especially as compared with those of the apes; (e) the cerebral fissures as criteria of zoologic or racial affinity, as indexes of physical or mental power, and as boundaries of functional areas. Lectures. Second term. Professor WILDER and Mr. CHANDLER.

9. **Comparative Anatomy of the Brain.** Beginning with the brain of the acanth shark, so far as possible the forms examined parallel and supplement those discussed in course 8. Besides his own dissections of several types the brains of the sheep and cat each student is also enabled to study and draw prepared specimens from many groups, including monkeys, apes, and man, fetal as well as adult. Practicums. Second term. Professor WILDER and Mr. CHANDLER.

10. **Advanced Brain Morphology.** Laboratory work and reading, with occasional lectures. Professor WILDER.

11. **Research and Thesis.** Professor WILDER, Assistant Professor REED, Dr. WRIGHT, Mr. ALLEN, and Mr. EMBODY.

12. **Seminary.** The instructing staff and advanced students.

For all the courses the ability to draw freehand and to read ordinary French and German will be found very useful. A year of Latin and of Greek will greatly facilitate the interpretation of the technical terms that are so largely derived from those languages.

The following arrangement of work will be found convenient:

I. Vertebrate Morphology.—Courses 5, 2, 3, (Histology desirable), 1 and 2. II. Systematic Zoology.—Courses 5, 6a, 6b, 6c, III. Ecology.—Courses 5. IV.—Neurology.—Courses (2 or 3 desirable), 8, 9, Histology (2 desirable), 10.

ENTOMOLOGY AND GENERAL INVERTEBRATE ZOOLOGY.

Professors: J. H. COMSTOCK, Entomology and General Invertebrate Zoology; A. D. MACGILLIVRAY, Entomology and General Invertebrate Zoology; W. A. RILEY, Entomology; J. G. NEEDHAM, Limnology and General Biology; G. W. HERRICK, Economic Entomology; C. R. CROSBY, Entomological Investigations.

Students are offered opportunity for advanced work in one or more of the following subjects: morphology of insects, embryology of insects, systematic entomology, invertebrate zoology, economic entomology, and limnology.

Each of the laboratories is well supplied with microscopes and other apparatus necessary for the special work carried on in it. The laboratory of morphology and embryology is especially equipped for histological work. Connected with the laboratory of systematic entomology there is a museum which contains, in addition to many exotic insects, specimens of a large proportion of the more common species of the United States. These have been determined by specialists, and are accessible for comparison. The collection includes many sets of specimens illustrative of the metamorphoses and habits of insects. There is also in this museum a good series of invertebrates other than insects. The advanced work in economic entomology is carried on largely in an insectary, which is a separate building; a second insectary adjacent to the laboratories is available for other phases of the work. A biological field station at the head of Cayuga Lake, one mile from Campus, and open throughout the year, affords exceptional opportunities for investigations in the biology of freshwater organisms.

The department of entomology has a library, which is rich in special works on entomology and contains complete sets of all of the more important entomological journals.

While the major part of the work of a candidate for an advanced degree in this field is expected to be research, there are certain courses which may be taken in partial fulfillment of the requirements for an advanced degree. This is especially true in the case of subjects elected for minors. The following is the list of such courses; further details regarding them are given in the University Register.

6. **Advanced Systematic Entomology.** Laboratory work either term by appointment. Assistant Professor MACGILLIVRAY.

7. **Histology of Insects.** Lectures, first term. T., 9. Laboratory work either term by appointment. Assistant Professor RILEY.

9. **Advanced Economic Entomology, and Insectary Methods.** Two hours, second term. Seminary, field and laboratory work by appointment. Assistant Professor HERRICK.

10. **Classification of the Coccidae.** Designed to familiarize the student with the more injurious species of scale insects, the methods of preparing specimens for study, and the systematic arrangement of the species. Second term. Lectures and laboratory work by appointment. Assistant Professor MACGILLIVRAY.

11. Morphology and Classification of the Arachnida. Laboratory work by appointment. Professor COMSTOCK

12. Morphology and Development of Insects. Lectures and demonstrations. Second term. T., Th., 9. Professor COMSTOCK and Assistant Professor RILEY.

14. German Entomological Reading. To aid the student in acquiring a knowledge of German zoological literature. Each student is required to subscribe for the periodical selected as the basis of the work, and in addition to reading this, some extended German monograph will be translated. M., 7-9 P. M. Assistant Professor RILEY.

17. Literature of Systematic Entomology. A systematic study of bibliographies, indexes, and general entomological literature; the preparation of catalogues of insects; the evolution of the rules of zoological nomenclature; and the methods of determining the priority of generic and specific names. First term. W., F., 11. Assistant Professor MACGILLIVRAY.

18. Embryology of Insects. Lectures and demonstrations. Second term. Th., 9. Assistant Professor RILEY.

19. General Limnology. Aquatic organisms in their qualitative, quantitative, seasonal, and ecological relations. Second term. Three hours. Assistant Professor NEEDHAM.

23. The Relations of Insects to Disease. Two hours, second term. Lecture T., 8. Practical exercise 8, 2-4:30. Assistant Professor RILEY.

24. The Classification of Immature Insects. Two hours, second term. Laboratory work by appointment. Assistant Professor MACGILLIVRAY.

Seminary. M., 4:30-5:30. The work of the entomological seminary is carried on by the Jugatae, an entomological club which meets for the discussion of current literature and of the results of investigations.

HISTOLOGY AND EMBRYOLOGY.

Professor: B. F. KINGSBURY.

Instructor: W. A. HILTON.

The department is well equipped with a good supply of modern microscopes, camera lucidas, polariscopes, micro-spectroscopes, photo-micrographic cameras, and other special apparatus, in sufficient number to give each student opportunity for learning to use them, and for applying them to any special study in which they

are called for. Two projection microscopes are available for blotting paper and wax plate reconstructions. The general and research laboratories are large and are equipped with microtomes, incubators, aquaria, etc. The collection of specimens is large and constantly increasing, and comprises preserved material and embryos as well as embryological and histological series of microscopic preparations of man and mammals and the lower vertebrates.

In addition to the general laboratory, preparation room, and private laboratory rooms for the staff, the department possesses a large and well lighted advanced laboratory with three small rooms for individual workers, a photomicrographic laboratory and dark room, a drawing and projection room. A museum of embryological models occupies the center of the advanced laboratory. The rich and varied fauna of the Cayuga Lake region affords favorable opportunity for investigations in the histology and embryology of all the main groups of vertebrates; the proximity of the abattoirs makes it possible to obtain material for the study of the development of the sheep, cow, and pig. Advanced work in histology and embryology is of necessity individual and is abundantly provided for under courses 7 and 8 below. In addition advanced students are sometimes recommended to take the general courses in the department, in whole or in part, namely courses 1, 2, 3, and 4.

1. **The Tissues.** The structure, origin, and development of the tissues of the body. The use and care of the microscope, special methods in the use of the instrument; the cell and cellular origin of the body, and the structure and development of its component tissues; general histological methods. Each student will prepare or receive a series of typical preparations. First term. Two lectures, recitations, or demonstrations. W., F., 11. Laboratory work. M., W., 2-4:30. Four hours. Professor KINGSBURY and Assistants.

2. **The Organs.** The structure and development of the physiological systems of the body and their component organs. A continuation of course 1. The two courses give the fundamental facts of the microscopic structure and development of the body. Second term. Lectures, recitations, or demonstrations, W., F., 11. Laboratory work, M., W., 2-4:30. Professor KINGSBURY and Assistants.

3. **Special Histology and Technique.** In this course a more detailed knowledge of histology and facility in technique are gained by practical work in one or more fields of histology. Designed for those who desire a good working knowledge of histology for use in biology or medicine. First term. One recitation,

demonstration or lecture. T., 8. Two laboratory periods, afternoons by assignment. Three hours. Professor KINGSBURY and Mr. ———.

4. **Embryology.** The development of animals, with special reference to the vertebrate group. Second term. One lecture, demonstration, or recitation. T., 8. Two laboratory periods, to be arranged. Three hours. Dr. HILTON.

7. **Advanced work in Histology and Embryology.** For those preparing theses for advanced degrees, and for those wishing to undertake special investigations in histology and embryology. Open to those who have had courses 1, 2, and 3, or their equivalents. A reading knowledge of French and German is indispensable for successful work in this course. Those who intend to take this course should confer with the head of the department as early as possible so that the work may be planned to the best advantage. Laboratory work, eight or more actual hours per week, with seminary (course 8). Professor KINGSBURY and Dr. HILTON.

8. **Seminary.** One hour. For the discussion of current literature and the presentation of original work by the members of the department staff and those doing advanced work in the department. It may be taken in connection with course 3 or course 7.

PHYSIOLOGY, BIOCHEMISTRY, AND PHARMACOLOGY.

Professors: SUTHERLAND SIMPSON; ANDREW HUNTER; MELVIN DRESBACH.

Instructor: ROBERT SCHROCK

For advanced and graduate work in Experimental Physiology two large laboratories and several smaller rooms are available. Laboratory (A) on the first floor of Stimson Hall is provided with electro-motor driven shafting and Sherrington recording drums of the most recent pattern, capable of giving wide ranges of speed. All necessary apparatus is available for graphic work in muscle and nerve physiology, for the investigation of problems in connection with the circulatory and respiratory systems, where objective records are desirable (for example, movements of the excised amphibian and mammalian heart), and for the experimental study of the special senses and the central nervous system. Pendulum and spring myographs are available and several forms of ergograph for the study of muscular and nervous fatigue. Each table is supplied with chronographs and time-recording tuning-forks, induction machines, keys, switches, commutators, etc. Adjoining this

laboratory are two smaller rooms; one is being equipped for experimental work on animal heat and body temperature, the other contains a Ludwig kymograph with accessories, and is used primarily for experimental pharmacology. There is also a dark room for photographic and optical work.

Laboratory (B) is devoted exclusively to research work. The equipment includes haemomanometers and blood-pressure apparatus of the most recent type, and a large Brodie kymograph for continuous smoked paper; a time-recording clock and artificial respiration and chloroform apparatus have just been added. Plethysmographs for recording volume changes in the various bodily organs are provided, and several clock-driven drums are available.

In connection with this laboratory there is a workshop and a skilled mechanic, who is capable of making and modifying any kind of apparatus which may be required for special research work. This is a very important adjunct to any laboratory where original investigation is being carried on and it has been found to save much time and to facilitate work greatly.

In the basement, on a solid concrete floor, a room is being equipped with galvanometers, capillary electrometers, shunts, rheocords, bridges, and all the other apparatus required in electrophysiology.

The biochemical laboratories on the second floor of Stimson Hall include a general laboratory, and a smaller research laboratory, both fitted throughout with water, gas, suction pumps, and draught cupboards. Adjoining these are a room for metabolic work, a balance room, a constant temperature room, and storerooms for chemicals and apparatus. In addition the laboratory enjoys the advantages of the workshop of the department, with its trained mechanic.

The equipment, which is being steadily increased along many special lines, is suited to the investigation of all kinds of problems connected with the chemistry and functions of the animal body, and includes, besides a large stock of glass apparatus, and the ordinary fittings of a chemical laboratory, several metabolism cages, large and small balances, polarimeter, Buchner press, and incubators.

Excellent facilities are provided for advanced and research work in all branches of pharmacology. The large collection of physiological apparatus described above is available for the investigation of the action of drugs upon animal tissues and organs, and the equipment necessary for work along chemical and pharmaceutical lines is also at the disposal of the student. Provision is thus made for the

investigation of a great variety of problems necessitating the employment of modern pharmacological and physiological methods.

There is great need of research work in this field, especially in the study of the precise action of drugs upon the animal body, and every encouragement is given to the student desiring special knowledges.

The department has a selection of the most important works of reference. The principle periodicals dealing with physiology, biochemistry and pharmacology are also kept in the building.

The following graduate courses are offered:

1. **Physiology.** Advanced laboratory work.
2. **Biochemistry.** Advanced laboratory work.
3. **Pharmacology.** Advanced laboratory work.
4. **Physiology of the Central Nervous System.** Lectures.

Some problem demanding original investigation will be prescribed for each student, who will be guided in his choice of a subject by one of the professors in charge, due consideration being given to his previous training and to the line of work in which he desires to specialize. Having selected a subject, he will be expected to concentrate his efforts upon it. While the work will be done under the supervision of one or other of the members of the teaching staff, and every facility provided in the way of apparatus, etc., the student will be encouraged to rely on his own resources as far as possible, especially in the planning and carrying out of his experiments. Any special apparatus which he may require or which he may himself design, will be made for him by the laboratory mechanic. It will be expected that the results of his work be embodied in a thesis, and if this is judged to be of sufficient merit it will be published in full or in abstract in some accredited scientific journal.

In addition to this specialized work, in order to give breadth of view, a course of reading will be assigned from time to time. This will be supplemented periodically by a colloquium, at which the current literature will be reviewed, and original papers presented for discussion by members of the staff and by other workers in the department.

ANATOMY.

Professor A. T. KERR.

Instructor J. P. SCHAEFFER.

The laboratories of the department are situated on the third floor of Stimson Hall and are thoroughly lighted, and the ventilation is almost perfect. For gross dissection there is a large general

laboratory and adjoining the dissecting room is a smaller laboratory for special work, fitted with a hood and other facilities for digestion, masceration, and the making of corrosion specimens. At the end of the main dissecting room is another laboratory for topographical and regional dissection; also a large dark room with a projection outfit and facilities for drawing sections for making reconstructions. Upon this floor is also situated a dark room with a complete outfit for taking photographs of special preparations for illustrating research work. In the basement is a compressed air apparatus for embalming and making special injections.

There is an abundance of anatomical material, which is embalmed and kept in cold storage so as to be ready for use when needed. The refrigerating apparatus is also used for freezing specimens for sections. In addition to the undissected material, there is ample supply of special parts, such as bones, brains, the various abdominal and thoracic organs, special sense organs, etc.

The department is well supplied with dissecting microscopes, glassware, reagents, and other necessities of an anatomical laboratory.

In connection with the department of histology and embryology every facility is offered for studying anatomical problems from both the gross and the developmental points of view.

In the library are to be found complete series of practically all of the important periodicals dealing with anatomy, and the proceedings and transactions of the learned societies. In addition, the library is well supplied with the most important anatomical monographs and books.

COMPARATIVE PATHOLOGY AND BACTERIOLOGY.

Professors: V. A. MOORE; S. H. BURNETT.

Instructors: W. H. BOYNTON; E. G. PETERSON.

The laboratories in comparative pathology and bacteriology are well equipped for research work in general pathology, the pathology of infectious diseases, and for bacteriological work especially in connection with animal bacterial flora, pathogenic organisms and problems associated with the morphology and physiology of bacteria and their products. The library facilities are good.

Candidates for advanced degrees should have had courses in general pathology and bacteriology equivalent to the course 40 and course 43 of Veterinary curriculum.

The following graduate courses are offered:

45. **Research in Bacteriology and Pathology.** This course consists of laboratory work with seminary, together with a few lectures on the methods of research in pathology and bacteriology. The students select their problem with the consent of the department and pursue it independently with the advice of the instructor immediately in charge.

46. **Laboratory Methods of Diagnosis and Meat Inspection.** This course is for students who have already taken elementary courses in bacteriology and pathology and who desire further information and practical training in methods for laboratory diagnoses. The course consists of one lecture and six hours of laboratory work weekly. The students taking this course are admitted to the department seminary.

VETERINARY PHYSIOLOGY.

Professor: P. A. FISH.

The department of veterinary physiology is well equipped for the study of physiologic problems upon the domesticated animals. The laboratories—located in the Veterinary College—are large and are provided with ample modern apparatus for such research as can best be conducted in the laboratories. In the same building there is a well assorted collection of recent books and periodicals on comparative physiology, which may be supplemented by the many works on general physiology in the University Library.

The field of research in connection with the domesticated animals is wide and inviting, and comparatively uncultivated. Interesting problems of practical importance await investigation in the subjects of milk secretion, digestion, respiration, breeding, diet, conditions affecting the flesh as food, as well as research upon the allied subjects of hygiene and sanitation.

The Veterinary Experiment Station, controlled by the college, and not far distant, can be utilized for field observations and the study of those problems outside of the scope of the laboratory. This combination of field and laboratory research should be conducive to important results. Such combined opportunities are not common, and properly qualified investigators may expect satisfactory returns.

As a preparation and aid in this research, attendance at the general lecture and laboratory courses in veterinary physiology is recommended.

SOIL TECHNOLOGY.

Professors: T. L. LYON; E. O. FIPPIN; J. A. BIZZELL.

Instructor: G. A. CRABB.

The facilities for graduate study in the Department of Soil Technology may be divided into two groups: first, those of the research laboratory in charge of Dr. LYON and Dr. BIZZELL; and second, those of the teaching laboratory in charge of Professor FIPPIN and Mr. CRABB.

The research laboratory is primarily concerned with investigation and is open only to graduate students who are working upon their major subject, although exceptions may sometimes be made to this rule when the work of the laboratory warrants it.

The laboratory is planned for chemical, bacteriological, and physical investigations of soil. The object has been to so equip it that a soil problem may be attacked through any of the known means of soil study. The usual facilities for the chemical analyses of soils and plants are at hand, and permit the determination of all of the constituents in the soil concerned in plant nutrition. For bacteriological work the laboratory contains among other apparatus an autoclav of the largest size, sterilizers, incubators for different temperatures; and for mechanical soil analyses, a centrifuge, a shaking machine, and other necessary apparatus. Two greenhouses provide opportunity for conducting crop tests of soils during the winter, and for experiments with nutrient solutions, and sand cultures. A field for plat experiments gives ample facility for work on a larger scale. In this field a series of large concrete tanks each holding between 3 to 4 tons of soil has recently been built. Pipes from these tanks carry the drainage water into a tunnel where it is collected for measurement and analysis. This is the most perfect apparatus for studying the effect of soil treatment on the composition of the drainage water that has ever been constructed. These varied and extensive facilities afford opportunity for students trained in any one or more of several sciences to investigate soil or plant nutrition problems.

In the teaching laboratories, special sections are set apart for graduate study. These are supplied with ample materials and are supplemented by work rooms and ample glass-house space, in addition to that already mentioned.

The general laboratory is equipped with many types of apparatus for soil study, including centrifugal apparatus for mechanical analyses, for constant temperature ovens, aspirators, titration apparatus, pressure filter pumps, etc., etc. There are in addition several

hundred samples of soils from all parts of the United States for comparison and classification. All the soil maps of the United States arranged in form for ready reference, and all the literature relating to the various phases of soil study to be found in the departmental and university library collections are available. The laboratories are supplemented by extensive field plots, and the University farm is used for the investigation of many problems which require that type of equipment.

The following courses are designed for advanced and for graduate students. They deal with the more technical phases of soil study, and are accompanied by corresponding laboratory courses for familiarizing the student further than is done in the elementary courses with the properties of soil, and are designed as a preparation for research work.

2. **Soils of the United States.** Deals with the classification, distribution and utilization of the soils of the country.

3. **Soil Mapping.** Preparation of detailed soil maps, together with adequate reports upon the same; practice in the general use of soil maps.

4. **Certain Phases of Soil Study.** Advanced Course. Lectures.

5. **Advanced Laboratory.** Chemical, physical and biological properties are studied at first hand. Designed particularly to accompany course 4.

6. **Irrigation and Drainage.** An intimate study of the soil from the standpoint of the practice of irrigation and drainage as related to soil improvement.

7. **Preliminary Investigation.** In preparation for some extended research to become a basis of thesis report.

RURAL ECONOMY.

Professor: G. N. LAUMAN.

The department of Rural Economy deals with economic and social problems of agriculture. In this general field little has hitherto been done in the United States, but the present is very much alive to the need of such study. It is not expected that all students will have a general knowledge of the subject of scientific agriculture in addition to training in economics and history; but for those who expect to specialize in this subject, a knowledge of the technical side of agriculture is strongly recommended. Many problems, however, may be successfully studied without the more technical training.

The library collections, general and departmental, are probably not exceeded in variety and completeness by any other similar collections, and are especially strong in the literature of rural economic and social problems, and technical agriculture. The literature of this latter subject contains a wealth of data as yet little used, and especially important in studying problems in the more technical side of agriculture.

As many general agricultural problems can be studied only by contact with the agricultural population, the close relations maintained by the College of Agriculture in the extension work throughout the state may be made an important help to the student.

FARM MANAGEMENT AND FARM CROPS.

Professors: G. F. WARREN; P. J. WHITE.

Instructor: K. C. LIVERMORE.

The divers types of farming which are carried on in New York State offer unusual advantages for the study of farm management. Some of the best and some of the poorest farms in the State are within easy reach of Ithaca. The agricultural survey work and other farm management investigations have furnished a large amount of new material for research work.

The department is provided with laboratories and collections for the study of farm crops. There is also a departmental reading-room with volumes of the books most frequently needed.

Graduate students who take farm crops as a major subject are expected to take the farm crops courses listed below, and must prepare an acceptable thesis based on original investigation. Those who take their major subject in farm management must prepare a similar thesis and take the farm management courses listed below. Students who take a minor subject in this department may arrange to take much of their work in the following courses.

1. **Cereals.** The history, production and marketing of cereal crops. Field trips are taken on all laboratory days when the weather is suitable. First term. Lectures, M., W., F., 10. Laboratory, M., or T., 2-4:30. Assistant Professor WHITE and Professor WARREN.

2. **Forage Crops.** The history, production and marketing of potatoes, field beans, forage crops, and miscellaneous crops. Second term. Lectures, and Laboratory. Assistant Professor WHITE.

4. **Advanced Farm Crops.** Open to a limited number of students. Second term. To be arranged. Assistant Professor WHITE.

5a and b. **Research.** Investigation of special farm crop subjects, and a study of current experiment station literature. Two or more hours. Open to a limited number of students. Admission and hours by appointment. Professor WARREN, Assistant Professor WHITE, and Mr. LIVERMORE.

1. **Farm Management.** Elementary farm accounting, selection and purchase of farms, cost and relative profit of various farm operations and systems of farming, organization of the farm business, with preparation of plans for the management of specific farms with financial estimates. Trips to farms are taken on all laboratory days when the weather is suitable. Two one-day excursions, about May 13-14 to farms at some distance from Ithaca, estimated to cost not over \$5. Second term. Lectures and Laboratory. Professor WARREN and Mr. LIVERMORE.

2. **Advanced Farm Management.** Lectures, problems, reading, and trips to successful farms. Expenses for the excursions are estimated not to cost over \$5. First term. Th., 2-5. Professor WARREN and Mr. LIVERMORE.

5a and b. **Research.** Investigations in special problems in farm management. Open to a limited number of students. Admission and hours by appointment. Professor WARREN and Mr. LIVERMORE.

15. **Seminary.** Required of all students taking research work in Farm Crops and Farm Management. Professor WARREN, Assistant Professor WHITE, and Mr. LIVERMORE.

ANIMAL HUSBANDRY.

Professors: H. H. WING; M. W. HARPER.

Instructors: G. W. TAILBY, JR.; E. S. SAVAGE.

Among the herds and flocks belonging to the College may be mentioned, the dairy herd of fifty cows, a flock of about fifty sheep of various breeds, a good-sized herd of breeding swine. The department has a very full collection of the herd and flock registries of all the breeds of domestic animals kept in this country, amounting to more than one thousand volumes, and affording excellent facilities for studies in heredity and genetics. Further work may be carried on in problems of animal nutrition based on investigations with the animals themselves.

37. **Advanced Course in the Principles of Breeding Animals.** Must be preceded by course 31. Lectures, conferences, and reports, including statistical methods as applied to breeding animals;

practice in making reports on statistical problems; individual study of the various breeds of improved stock. Th., 11. Professor WING and Assistant Professor HARPER.

38. **Advanced Course in the Principles of Feeding.** Must be preceded by course 31 and Agricultural Chemistry course 85. Will not be given unless elected by at least five students. Lectures and reports. First term. T., Th., 9. and Professor WING and Mr. SAVAGE.

POULTRY HUSBANDRY.

Professors: J. E. RICE; C. A. ROGERS.

The department has a variety of different breeds of fowls with which to carry on feeding and breeding experiments, and is provided with incubators and brooders for investigations in incubation and brooding. The laboratory contains facilities for anatomical work. In addition to a very complete set of bulletins in the poultry library assembled from the various experiment stations in the United States and Canada, numerous books on poultry husbandry are available in the University Library, the library of the Agricultural College and the special departmental library. The department also possesses a topical card index, with cross references, of the principal poultry books, bulletins, and magazines.

Owing to the fact that very few colleges give the undergraduate courses in poultry husbandry which are prerequisite to taking graduate work in this department, very few students coming from other colleges can enter immediately upon graduate work. Most students will find it necessary to take a year of undergraduate courses before beginning graduate work.

Courses of instruction for an advanced degree can be taken along the lines of poultry nutrition investigations, poultry breeding, and in co-operation with the New York State Veterinary College, in poultry diseases investigations; in co-operation with the department of Agricultural Chemistry, incubation and feeding investigations; and with the Department of Histology and Embryology, incubation experiments.

DAIRY INDUSTRY.

Professors: W. A. STOCKING; C. A. PUBLOW; H. E. ROSS.

Assistant: E. S. GUTHRIE.

The laboratories of the department are well equipped and offer good opportunities for research work. Special mention may be

made of the research milk testing laboratory and a research bacteriological laboratory.

All courses offered by this department are open to graduate students for fulfilling the requirements of their major and minor subjects. These courses include the following: Fundamental principles of milk secretion and testing; Principles of butter-making; Principles of cheese-making; including American cheddar and fancy varieties; Principles of market milk production and inspection; Dairy mechanics; Introductory bacteriology.

The following courses are especially suited to graduate students: Dairy Bacteriology; Advanced Milk Testing; Seminary, Investigation in any line of dairy work or agricultural bacteriology; Advance work in business methods as applied to Dairy Industry.

MECHANICAL AND ELECTRICAL ENGINEERING.

Machine Design and Construction.

Professors: D. S. KIMBALL; G. R. McDERMOTT, Structural Design; H. D. HESS; E. H. WOOD; C. D. ALBERT; A. E. WELLS, Superintendent of Shops.

Instructors: H. M. DOUGLASS; D. R. FRANCIS; H. L. FREEMAN; S. J. FULLER; E. F. GARNER; C. W. HAM; L. D. HAYES; S. G. MILLER; P. L. PEACH; J. A. ROSS; H. STEPHENSON; J. F. STEVENS; F. B. WETHERILL; J. T. WILLIAMS.

Experimental Engineering.

Professors: R. C. CARPENTER; HERMAN DIEDERICH; W. M. SAWDON.

Instructors: A. G. BIERMA; G. L. CURRENT; V. R. GAGE; T. B. HYDE, R. P. LAY; G. W. LEWIS; L. G. NIGHTINGALE; R. L. SHIPMAN; C. E. TORRANCE; G. B. UPTON; W. R. WIGLEY; L. A. WILSON.

Power Engineering.

Professors: A. W. SMITH; W. N. BARNARD; C. F. HIRSHFELD.

Instructors: F. A. BURR; A. G. KESSLER; ROBERTSON MATTHEWS; H. M. PARMLEY; R. W. WEED, JR.

Electrical Engineering.

Professors: H. H. NORRIS; VLADIMIR KARAPETOFF; G. S. MACOMBER; W. S. FORD.

Instructors: F. G. ANDERSON; B. C. DENNISON; J. F. H. DOUGLASS; A. D. DuBOIS; W. E. HOGAN; A. B. HOLCOMB; A. M. HOLCOMB; F. H. KROGER; E. J. MACILRAITH; I. C. PETTIT; F. G. TAPPAN.

Advanced work is offered in the design, construction, and application of the machines and other devices used in mechanical and electrical engineering. Special research problems for solution under instruction will be assigned. The equipment available for the purpose of graduate students is as follows:

The main building of Sibley College is three hundred and seventy feet long, fifty feet in width, and three stories in height. It contains the reading room and reference library, drawing rooms, lecture rooms, offices and class rooms and a large well-lighted auditorium. The workshops are placed in separate buildings and consist of a machine shop, a foundry, a blacksmith shop, and a wood-working shop, and include rooms devoted to the storage of tools. Besides these there is an additional building, one hundred and fifty feet by forty feet in dimensions, and two stories in height, occupied by the laboratories of the department of experimental engineering, and a building fifty feet by seventy feet devoted to electrical experimental engineering, besides several basements occupied by different branches of experimental work. The basement and first two floors of Franklin Hall are also occupied by the department of electrical engineering. A separate boiler house, thirty feet by forty feet contains the boilers for the use of the department of experimental engineering.

The Workshops are fully equipped throughout with standard hand and machine tools from reputable makers, the machine tools having been selected with a view of not only giving manual instruction, but also of modern manufacturing methods. Many of the hand and machine tools are the product of the College shops.

Laboratories. The *mechanical section* of the laboratories is divided into several departments, each of which is supplied with machines, apparatus, and instruments necessary for instruction and research.

The *materials testing laboratory* is equipped for tension and compression tests with one Olsen 300,000 pound machine, one Riehle 100,000-pound machine, one 200,000-pound Emery hydraulic machine, together with several other machines varying in capacity from 10,000 to 100,000-pounds. For transverse tests there is a Riehle machine of 200,000 pounds capacity and a Fairbanks machine

of 10,000 pounds capacity. There is one Olsen torsion machine of 200,000 inch-pounds capacity, and two Thurston autographic torsion machines. The equipment includes measuring instruments such as sextensometers, a cathetometer, and other apparatus required for the determination of the physical qualities of engineering materials under tensile, compressive, transverse and torsional stress.

In the *steam laboratory* there is a 150 H.P. triple expansion Allis-Corliss engine so fitted that it may be run as a simple, compound or triple engine, condensing or non-condensing. There are also many smaller engines, including one McEwen, one Straight Line, one Harris-Corliss, and two Payne engines, together with three surface condensers which may be connected up to these engines as desired. There is one 35 K.W. horizontal Curtis turbine and one 15 K. W. De Laval turbine. These turbines drive electric generators and may be run condensing or non-condensing.

For air compression there is a two-stage steam driven Ingersoll-Rand compressor, and three air-brake pumps of different types, together with meters, nozzles, and other instruments used in testing. The action of the air-brake may be studied in a complete brake equipment for a 25-car train. This part of the laboratory also contains several motor-driven fans, including one of the Sirocco type.

The equipment of apparatus and instruments used for engine testing comprises about 80 indicators of different types, about 75 steam gauges, a number of calorimeters for the determination of the quality of steam, speed counters, tachometers, planimeters, etc., besides a number of dynamometers of various kinds.

The boiler section of this laboratory has one 150 H.P. Babcock & Wilcox water-tube boiler of the marine type, and one 100 H.P. Babcock & Wilcox water-tube boiler of the standard type, both of which are fitted with internal superheaters. There is also one 80 H.P. Heine water-tube boiler and one 25 H.P. Roberts safety boiler connected with a Foster outside superheater. The auxiliary apparatus consists of one Cochrane open heater, one Wainwright closed heater, steam pumps, traps, injectors, etc. A full set of scales, measuring tanks, gauges, flue-gas apparatus, separating and throttling calorimeters, pyrometers, etc., completes the boiler equipment.

The *gas engine laboratory* contains one 8 H.P. Westinghouse gas engine, one 8 H.P. Olds gasoline engine, one 8 H.P. Fairbanks gasoline engine, one 6 H.P. Hornsby-Akroyd oil engine, one 12 H.P. Priestman oil engine and one 16 H.P. Acme gas engine. The latter

is run on producer gas from a 15 H.P. suction gas producer. A 50 H.P. suction gas producer is in course of erection. This engine equipment is chosen to give as great a variety as possible as regards fuel used, type of governing, etc. Hot air engines are represented by one Rider and one Ericsson engine. This laboratory is well equipped for work of investigation and testing, having a special testing floor. The supply of testing instruments includes several outside spring indicators, optical indicators and a manograph. For temperature measurements there are available high-reading thermometers and pyrometers of the expansion and electrical types.

In the *hydraulic laboratory* are found several small water wheels of the Pelton type, one small American turbine, several rotary and centrifugal pumps, and three hydraulic rams of different types and capacities. For the determination of the flow of water there are weir boxes and weir tanks, weir notches of different types, nozzles, hook gauges, a current meter and several Venturi tubes.

The *oil testing laboratory* contains one Cornell oil testing machine, one Thurston standard railway testing machine, and several smaller Thurston machines. The rest of the equipment consists of several viscosimeters of different types, together with the necessary hydrometers and thermometers.

For the study of *refrigeration* in all of its phases, the mechanical laboratory possesses a very complete York refrigerating plant having a capacity of 15 tons, besides a Brunswick and a De La Vergne machine of small size.

The *cement laboratory* not only contains the ordinary apparatus for the testing of cement and concrete but in addition is equipped with crushing and grinding machinery and a small vertical kiln for making investigations on the manufacture of cement from raw material.

The laboratory equipment includes apparatus for the study of power transmission, such as Morin and Webber transmission dynamometers, a Reeves variable speed transmission, and a belt testing machine, by means of which not only the efficiency of transmission but also the amount of belt slip and the coefficient of friction may be determined.

The Electrical Section of the laboratories is fully equipped with modern apparatus for experimental lectures, laboratory practice, plant testing, standardizing of instruments and investigation. This apparatus has been selected primarily to exemplify modern shop tests and to familiarize the student with the practical apparatus as well as the theory of operation of electrical devices.

In addition to the usual complement of apparatus for demonstration, the lecture equipment includes an air-insulated, high-pressure transformer, with necessary regulators for subjecting insulators and insulating material to alternating pressures up to 60,000 volts. This may be supplemented by additional transformers for raising the pressure still higher. A 30,000 volt inductorium provides current for wireless telegraphy. Large cathode ray tubes, supplied from a special multiple plate, power driven static machine, are used for the demonstration of alternating current phenomena. All the standard equipment, as well as many pieces of specially designed apparatus, are employed to show the classes the operation of the principal laws applied in electrical engineering. Exhibits of apparatus, such as street railway car controllers, rail sections, insulating and line material, etc., are provided in profusion. This list includes a complete outfit for exhibiting in actual operation the multiple system of electric car control. The laboratory apparatus comprises a full complement of modern alternating and direct current machinery of all kinds. The alternating current equipment includes single and polyphase alternators and synchronous motors, induction motors, transformers and all apparatus auxiliary thereto. A large variety of direct current dynamos and motors suitably mounted for testing, cover the field of direct current machinery. A De Laval steam turbine, geared to a double current generator, a direct connected marine set and circuit breakers, switches, water rheostats, and other auxiliaries are in use for plant test experiments. The plant testing is done largely outside of the College building, and for this purpose a large variety of ammeters, voltmeters, wattmeters, and other instruments are maintained in adjustment at a high standard of accuracy. These instruments have capacity great enough for testing the largest power plants. Special facilities are provided for the standardization of all electrical apparatus. Board of Trade and Reichanstalt standards of resistance with large current carrying capacity, potentiometers and galvanometers, and reference standards of electromotive force are among the facilities provided for this purpose. A remarkable set of generators recently installed produces a pressure of 14,000 volts, direct current by connecting in series, and most carefully insulating twenty-four 550 volt dynamos. The pressure thus available opens up a wide field for investigation. In addition to the apparatus in the laboratories, the students may observe in operation a three-phase power transmission in the local power and lighting service. Large direct-connected generators, rotaries, constant current regulators, and induction motors, as well

as the lighting and railway system are convenient for inspection. The University has recently installed a modern hydro-electric plant containing three large three-phase alternators direct driven by Doble impulse water wheels. The power station also contains smaller units for direct current supply with all necessary auxiliary apparatus. This equipment is available for study.

The heads of departments in Sibley College will be pleased to supply further information regarding details of facilities.

CIVIL ENGINEERING.

Graduate work is offered by the following departments in the College of Civil Engineering.

GEODESY AND ASTRONOMY.

Professors: D. A. MOLITOR, Topographic and Geodetic Engineering; O. M. LELAND, Geodesy and Astronomy; S. L. BOOTHROYD, Topographic and Geodetic Engineering.

Instructors: L. A. LAWRENCE; P. H. UNDERWOOD; J. C. McCURDY.

The geodetic equipment is probably unsurpassed in completeness in this country except in the government service. The library facilities in this subject are also unusual, embracing the principal books relating to geodetic work in all parts of the world.

The Fuertes Observatory is a brick building eighty feet long. It contains a transit room with four piers; three domes, one of which contains an equatorial telescope, while the others are used for altazimuths; a clock room with piers for level trier and pendulum apparatus; two computing rooms; and an instrument room.

The metric laboratory for the comparison of standards of length is in the basement of Lincoln Hall and is especially constructed with double walls so as to have as nearly a constant temperature as practicable. It contains the four-meter comparator and a pier for gravity determinations.

The following outline shows the various classes of work that may be undertaken in this department and the character of the equipment.

Geodesy and Geodetic Methods. The works of Crandall, Jordan, Helmert, and others may be used for special reading. The publications of the United States Coast and Geodetic Survey and of the International Geodetic Association are available for reference.

Geodetic Astronomy. Determinations of time, latitude, longitude, and azimuth are considered. Chauvenet's, Doolittle's, and Hayford's books on this subject may be used as texts.

In connection with the study of star positions, the library contains an assortment of the standard catalogues of stars and the publications of many of the leading observatories of the world. Direct observations may be made with the equatorial telescope of four and one-half inches aperture. This instrument is also suitable for observations of the positions of comets, the components of the easily separated double stars, etc., and the theoretical studies may include similar topics.

For the practical work at the observatory, the equipment includes, besides the equatorial telescope, an astronomical transit by Troughton & Sims; a meridian telescope and two zenith telescopes by Fauth, one of the latter being adapted to photographic methods; altazimuths by Troughton & Sims and Fauth; a Howard mean-time clock; chronometers by Negus and Nardin; and surveyor's transits, sextants, and auxiliary instruments of various kinds.

Adjustment of Observations. Observations of a geodetic nature will be considered, or this work may be made to apply to other lines of investigation if desired, such as physics, mechanics, and hydraulics. A general treatment of the method of least squares will be given if desired.

Terrestrial Magnetism. A Kew magnetometer, a Barrows dip circle, and a declinometer afford means for investigating the magnetic elements.

Gravity. One of the piers of the department has been occupied as a gravity station by the U. S. Coast and Geodetic Survey, and is therefore connected, through Washington, with the absolute determinations made at Potsdam, in Germany.

The instrumental equipment for this class of work includes, besides a Kater pendulum, a Mendenhall half-second pendulum apparatus, of the pattern used in the U. S. Coast and Geodetic Survey, the pendulums being swung in a partial vacuum. The literature of this subject is well represented in the library.

Standards of Length. For the study and comparison of measures of length, the metric laboratory is provided with a four-meter comparator with micrometer microscopes, carriage movable transversely to accommodate two or more measures simultaneously, an ice-bar apparatus, etc. This comparator is in a case for protection from sudden changes of temperature, and the laboratory temperature is fairly constant. A four-foot comparator is available for the direct study and graduation of leveling rods.

For the investigation of the behavior of apparatus, especially tapes, under field conditions, and also for the standardization of

tapes, a 100-meter comparator has been constructed and the auxiliary instruments are in process of manufacture. The end marks are under ground and well isolated from surface disturbance. Micrometer microscopes on the piers above these marks will be referred to them by means of Repsold cut-off tubes the tapes being observed directly through the microscopes. A 50-meter Invar tape will be used in this work, its standardization having been made with exceptional precision by the National Bureau of Standards.

The graduation of scales, as well as their study, is facilitated by means of a dividing engine made by the Société Générale. For the most delicate graduation work, attention is called to the large Rogers dividing engine in the Department of Physics.

The laboratory standard of length is a steel meter bar of the international type, by the Société Générale. It has been compared with an international prototype at Washington. A Rogers four-inch and decimeter scale on speculum metal, accurately compared, is also available, as well as a brass line-and-end-measure yard.

Investigation of Instruments. In addition to the special equipments mentioned above, considerable apparatus of an auxiliary character for the investigation of instruments is at hand. Notable pieces are the large Dodge-Mayhew level-trier, a spherometer with special adaptation for the study of pivots, a pair of pier collimators, micrometer microscopes, etc. Also, there are the usual engineering instruments of many types, transits, theodolites, heliotropes, levels, and meteorological instruments. For standards of temperature, there are several precision thermometers, by Boudin, Tonnelot, and others, some of which have been standardized at the International Bureau at Paris. A special comparator is available for the calibration of thermometers, and there is a pyrometer for the study of high temperatures.

The following courses may be taken by graduate students in partial fulfillment of the requirements for an advanced degree. The character of the work, as well as the amount of time to be devoted to it, will be arranged with each student. It is usually desirable that the theoretical reading be accompanied by illustrative laboratory work, and in the more advanced stages of his work the student will usually devote most of his time to special investigations.

(a) **Geodesy and Geodetic Methods.**

(b) **Advanced Geodetic Astronomy.**

(c) **Adjustment of Observations.** Method of Least Squares.

(d) **Geodetic Laboratory.**

13. **Geodetic Surveying.** including the elements of geodetic astronomy and adjustment of observations. First term. Five hours.

APPLIED MECHANICS AND HYDRAULICS.

Professors: I. P. CHURCH, Applied Mechanics and Hydraulics; F. J. SEERY; Civil Engineering; A. P. MILLS, Testing materials.

Instructors: W. E. PIPER; PERCY HODGE; W. R. CORNELL; R. McL. BOWMAN; D. MOOMAW; W. J. MCKEE.

The technical library in Lincoln Hall contains a full collection of the important books dealing with Applied Mechanics and Hydraulics, complete sets of all representative engineering periodicals, journals of the principal technical societies, and government reports on technical investigations.

The Cement Laboratory. Contains machines for tension tests, compression machines of from two to two hundred tons capacity, an impact machine, and a special machine for determining automatically the rate of setting and hardening of cement. For direct experiment with cement there are also provided a large number of tension and compression briquette moulds, a water tank with capacity for the storage of three thousand briquettes, a moist oven with a capacity of seven hundred briquettes, and three drying ovens; scales, slate and plate-glass mixing tables, thermometers, a Bunsen pump for determining permeability, several sets of apparatus for measuring linear and volume changes during setting, and apparatus for determining the specific gravity, normal consistency and time of set, and constancy of volume by normal and accelerated tests; also standard sieves for determining fineness, and apparatus for determining voids in sand and stone.

The Equipment of the Testing Laboratory for materials of construction and for full sized members, joints and structures includes: a Riehlé 400,000 lb. Testing Machine with a capacity for beams and girders up to 19 inches in width and to 18 feet in length and for specimens in tension and compression up to 12 ft. in length, a Riehle 100,000 lb. testing machine, and an Olsen 50,000 lb. machine; an Olsen 10,000 lb. wire testing machine; a Thurston autographic torsion testing machine; a Riehlé torsion testing machine of 60,000 inch-lbs. capacity, for testing rods and shafts up to one and a half inches in diameter and six feet in length;

For Experimental Hydraulics see p. 87.

a Riehlé 5,000 lb. transverse load testing machine for flexular tests of bars of wood and metal up to four feet in length; an Amsler-Laffron compression testing machine; a standard Page impact machine for tests of road material; a Riehlé grinder for stone specimens; a standard Deval machine for abrasion tests of road material; and a standard rattler for paving brick.

The equipment also includes a set of torsion clinometers for use with the Riehlé torsion machine; a Henning extensometer for tension tests of metals, and two self indicating dial extensometers with fittings which adapt them for use in testing steel or iron tension or compression specimens, and also for testing full sized concrete beams and columns and for tests of wire. The Martens mirror extensometer is also available. Knock-down forms are provided for the making of large concrete beams and columns.

The following courses are available for graduate students, in partial fulfilment of the requirements for an advanced degree:

26. Advanced Mechanics. Linear arches; curved beams; special cases of flexure; problems in the mathematical theory of elasticity; thick hollow cylinders and spheres; plates; Castigliano's theorem of least work; internal work and its derivatives, with applications. First term. Three hours. Professor CHURCH.

27. Special Courses in Advanced Mechanics. Special courses of reading and study will be arranged for graduate properly prepared. A reading knowledge of both French and German is highly desirable in this connection. Professor CHURCH.

29. Engineering Problems. Practice in using the principles and methods of Applied Mechanics, both of solids and fluids. A series of problems, such as occur in ordinary engineering practice, and covering a wide range of topics is given out for solution. Computations and reports. Second term. Six hours.

30. Testing Materials. Special investigations of an advanced nature of the properties of structural units and the materials of construction. First term. Seven and one half hours. Professor CHURCH and Assistant Professor MILLS.

31. Hydraulic Construction. Design and construction of dams, including the derivation of Wegman's Formula for the profile of a high masonry dam, and the design and construction of earthen, timber, and metallic dams. Water Storage, which includes the investigations of a reservoir site, surveys, borings, and cost of storage; the design of spillways and flood channels; and the effect on the stream discharge for various capacities of storage. Irrigation engineering, including the special structures and agricultural

features involved; the conveyance of water in canals, flumes, and pressure conduits. Assistant Professor SEERY.

32. **Water Power Engineering.** The development of power on a stream, including the economic and commercial features affecting the value of a mill site; river hydraulics; the selection of turbines and a study of their characteristics; speed regulation; design of penstocks, arrangement of machinery, etc., effect of pondage, storage, and load factor, on capacity and equipment. Assistant Professor SEERY.

91a. **Hydraulic Engineering.** Design of hydraulic works, plants, and appliances, such as aqueducts, canals, irrigation works, locks, lift-locks, lock-gates, dams, reservoirs, stand-pipes, elevated tanks, systems of water works (gravity, pneumatic or pumping systems), drainage works, power plants, water turbines and other hydraulic motors. Second term. Three hours. Professor CHURCH and Assistant Professor SEERY.

EXPERIMENTAL HYDRAULICS.

Professors: E. E. HASKELL; E. W. SCHODER; K. B. TURNER.

The Hydraulic Laboratory by reason of its unique location and unusual facilities is adapted to investigations of great value to hydraulic science and the engineering profession. The water supply is obtained from Fall Creek with a watershed of 126 square miles. Beebe Lake, a pond of about 20 acres, has been formed by the construction of a concrete dam 26 feet high, with a spillway crest length of 130.5 feet. At one end of the dam there is an additional flood spillway 141.5 feet long. A rectangular canal 420 feet long and 16 feet wide is supplied from Beebe Lake through six head-gates, for controlling the amount of flow. The upper portion of the canal is 17.7 feet deep and the lower portion is 10 feet deep. In this canal are two sharp crested weirs 16 feet long over which discharges as large as 400 cubic feet per second may be passed.

A branch canal 6 feet wide leads from the lower end of the large 16-foot canal into the upper portion of the laboratory building which is built against the cliff of the gorge. This branch canal may also be supplied directly from Beebe Lake by means of a 48-inch cast iron pipe line with a short 30-inch branch at its lower end. Two sluice gates control the flow from the large canal, and a 30-inch valve controls the flow from the 48-inch pipe into the 6-foot canal. The 6-foot canal within the laboratory building discharges either to

waste into the pool below Triphammer Falls (a sheer drop of 60 feet) or into the upper end of a steel standpipe 6 feet in diameter and 60 feet high. A suitable mechanism causes an instantaneous diversion of discharges as large as 60 cubic feet per second from the waste flume into the standpipe or *vice versa*. The 6-foot standpipe is provided at the bottom with a 36-inch discharge valve operated by hydraulic pressure. There is a float gage indicating accurately the height of the water surface in the standpipe.

The lower portion of the large 16-foot canal, 350 feet long between weirs, is used for measurements with floats and current meters. An electrically operated car spans this canal and is used for rating the current meters. Models of dams may be built in the canal and the flow over them investigated with precision.

There is an outdoor equipment for pipe flow experiments with pipes as large as six inches in diameter with a concrete tank for precise measurements of flow. The 8-inch pipe line supplying the University filtration plant is available for experimentation, giving a head of 225 feet.

A concrete Cippoletti weir with steel edges and with a crest length of 16 feet, and depth of notch of six and one-half feet is built in the gorge below Beebe Lake dam and serves to measure the creek flow to calibrate the dam and the 5-foot flood gate in the dam.

Part of the equipment of the University power plant may also be used for certain kinds of hydraulic experimentations. The available head here is 135 feet.

The following courses are available for graduate students:

41. Hydraulic Measurements. Practical problems involving hydraulic measurements and reduction of data. Most of the experiments are intended to test the accuracy of various measuring devices and methods as well as the exactness of various formulas in hydraulics. These problems and experiments include: current meters and floats in open channels and streams; the Pitot tube, water meters, nozzles, weirs, and hydraulic rams; construction of pipe flow diagrams. Second term. Three afternoons. Professor HASKELL, Assistant Professors SCHODER and TURNER.

43. Advanced Experimental Hydraulics. The facilities of the hydraulic laboratory are available for thesis work and for experimental investigations by graduate students. Professor HASKELL and Assistant Professor SCHODER.

SANITARY ENGINEERING.

Professors: H. N. OGDEN; C. L. WALKER.

The courses offered to graduate students may be divided into two classes, viz: first, those dealing with the design, construction and operation of sewage disposal plants and of water purification plants; and second, those fundamental studies in chemistry, biology, and bacteriology, which the undergraduate student in civil engineering has not been able to pursue.

A sewage disposal plant in the city of Ithaca offers opportunity for experimental study of septic action and of sedimentation. Within a short distance from Ithaca are five other plants, well adapted for critical examination of efficiencies, and numerous other opportunities are offered for the study of similar questions.

The laboratories in all the related subjects are open to graduate students in sanitary engineering. The courses in organic chemistry are well adapted to the study of the disposal of trade wastes. The courses in mycology and botany afford excellent opportunity for studying the life history of algae and other water plants which affect both stream pollution and purification. The courses in bacteriology deal not only with water bacteria and the colon types, but also with pathogenic forms interesting from the standpoint of epidemiology. The courses in the Medical College enable the student to trace the effect of the pollution of water supply and to acquire a working knowledge of the water-borne diseases. Finally, the branch of the State Hygienic Laboratory, established in the College, gives an unequalled opportunity for students to acquire not merely laboratory technique in water analysis, but a practical training in the forms of interpretation. This laboratory is also available for experimental studies of the efficiency of water and sewage plants and of methods of dealing with the refuse from factories. The library is well provided with the literature of the subject.

The following courses are recommended for graduate students in sanitary engineering.

56. Municipal Engineering. A discussion and study of questions other than water and sewerage dealing with the health of cities. Lectures, reports, and readings. Three hours.

57. Purification of Water. Specific problems in water purification; control of watersheds; effect of sedimentation on waters of different compositions; treatment of waters for particular require-

ments, such as removal of hardness, sediment, bacteria, etc. A report on some existing water system will be required from each student. Three hours.

58. **Conference on present methods of sewage disposal.** A critical study of the construction and operation of plants now in existence. Inspections and reports. Three hours.

59. **A Laboratory Course** devoted to some special problem of sewage or water, such as the operation of a water filtration plant, a sewage disposal plant, the purification of trade wastes, the value of disinfection, etc.

The following courses in other departments of the University may profitably be taken up by graduate students in Sanitary Engineering:

History and Political Science, Course 76a; History and Political Science, Course 96; Chemistry, Course 30; Chemistry, Course 75; Botany, Course 11; Entomology, Course 19; Medical College, Course 43.

RAILROAD ENGINEERING.

Professors: C. L. CRANDALL; F. A. BARNES.

The library contains an excellent collection of books, periodicals, and proceedings of engineering societies on railroad construction and operation covering American and European practice for both steam and electric roads. Surveys and maps of locations made by the undergraduate classes during many years form an excellent basis for study and comparison of alternate routes with existing lines. Standard plans and other data have also been contributed from time to time by the railroad companies and others for the use of the department.

The college laboratories for experimental hydraulics and cement work, and for the study of the strength and other properties of the materials for track and structures, are available for those specializing in this field.

The following courses may be taken as a part of the requirements for an advanced degree:

61. **Railroad Maintenance of Way.** Track materials, with special reference to the section, method of manufacture, and composition of steel rails; to the economics of tie preservation and the use of metal ties; and to the effect of quality of ballast upon maintenance; machine and other methods of grading for second track; drainage;

track laying both by machine and hand methods; ballasting and bringing new track to line and grade; turnouts and switches; side tracks and yard tracks; sorting and terminal yards; track maintenance; action of car wheels on curves; stresses in track; widening of gage; double tracking; separation of grades; and improvement in grades and alignment. First term. Lectures and recitations. Professor CRANDALL.

62. Railroad Operation and Management. The general principles underlying organization and the effect of each on efficiency; principal departments of railway service with a brief outline of the work of each; departmental and divisional systems of organization, with examples on various roads and discussion of adaptability of each; the duties of officers and the work of the different departments; the most important laws affecting railroads; freight traffic, freight houses, classification yards, car service rules, accounting; signaling and interlocking.

Second term. Lectures and recitations three hours per week. Assistant Professor BARNES.

91C. Railroad Engineering Design. Individual problems are assigned in conference with the student. These include: designs for track layouts and details, small depot buildings and freight houses, culverts, bridge masonry, subway construction; grade separation structures; water tanks, track and elevated, of steel, timber, or reinforced concrete; coaling plants, etc. Bills of material and estimates of cost are usually required. Professor CRANDALL.

Special Courses. Special courses of investigation and study will be arranged to meet individual needs, to be pursued under the general direction of the professor in charge.

Attention is called to the facilities available in other departments of the University to supplement the work above outlined, as for example, in Political Science the course on railroad transportation and in Electrical Engineering courses dealing with the applications of electricity to the operation of railroads.

BRIDGE ENGINEERING.

Professors: H. S. JACOBY, Bridge Engineering; DONALD DERICKSON, Structural Engineering.

Instructors: A. C. IRWIN; R. P. DAVIS.

A collection of over seven thousand blue prints is available giving detail plans of American railroad and highway bridges of various types in modern use, and there are also about one thousand selected photographs of all classes of bridges designed in this country.

The twenty-six bound volumes of blue prints used for office reference by the late George S. Morison, which contain the plans of all the bridges designed under his direction as consulting engineer form a part of the reference library.

The library contains practically all the important books on bridge and structural engineering. It also contains a valuable collection of theses, those on original investigations relating to arch bridges being especially noteworthy. These investigations have been conducted so as to form an extended and closely related series. Their results form an important addition to previous knowledge on the relative strength, stiffness, and weight of different types of construction, and on the methods for their investigation and design.

The following courses may be taken in partial fulfilment of the requirements for an advanced degree:

72. Reinforced Concrete Arch. The design of an arch of reinforced concrete, including its abutments and centering; investigation of the arch ring under partial and full live loadings, in accordance with the elastic theory. Supplemented by several illustrated lectures on the different types of concrete arch bridges of recent construction. Lectures, computations, and drawing. Twice a week.

73. Higher Structures. Determination of the loading and stresses in continuous girders and trusses, swing bridges, and metallic arches. Both analytic and graphic methods are used. Accompanied by historical notes on arches, drawbridges, and cantilever bridges. Three hours.

74. Masonry and Foundations. The cofferdams, cribs, sheet piling, metal cylinder piers, pumping and dredging, the foundation, and the location and design of piers; piles and pile driving; pneumatic caissons; open caissons; foundations of buildings. Recitations and reports. Three hours.

77. Concrete Construction. Intended to cover in a systematic manner those principles of mechanics upon which the design of reinforced concrete structures is founded. The work in the drawing room consists of the design of a portion of a reinforced concrete building, and includes the details of slabs, rectangular beams, T-beams, columns, and footings. Three hours.

Special courses of investigation and study will be arranged as may be desired, to be pursued under the general direction of the professor in charge.

ARCHITECTURE.

Professors: C. A. MARTIN; JEAN HEBRARD; O. M. BRAUNER;
A. C. PHELPS; GEORGE YOUNG.

Instructors: H. S. GUTSELL; G. R. CHAMBERLAIN; G. R. THOMPSON;
CHRISTIAN MIDJO.

Graduate work is offered in Architectural Design; the History of Architecture, Painting, and Sculpture; and Drawing, Painting, and Modeling in their relation to design in architecture.

For the Master's degree either Architectural Design or the History of Architecture may be elected as a major subject; while minors may be taken in drawing, or in a wide variety of special subjects in the general field of history or research in architecture and the allied arts of painting, sculpture, decoration, and the arts and crafts.

Candidates for the Master's degree in Architecture must be graduates of schools of equal standing with the College of Architecture, and their training in design or other subjects elected for graduate work must be equivalent to the training required in this college for the degree of Bachelor of Architecture.

The equipment and facilities within the limits of the work offered or undertaken are of the highest order. In addition to the library and rooms used for lectures, recitations, exhibition purposes, offices, etc., the college has nearly fifteen thousand square feet of floor space in studios devoted exclusively to the work in design and drawing. The large studios for the work in drawing from the antique, still life, and from life, are thoroughly equipped with full size plaster casts—several hundred in all—of sculpture from the best periods of the art; particularly from the Greek, Roman, and Italian Renaissance, with examples from the Mediaeval and later Renaissance periods. The equipment for the work in color and modeling, which are taken only as minor subjects, is also excellent.

Supplementary to the equipment provided by the University Library there is a special library of works on architecture and the allied arts, surpassed in size by only one other in the country and surpassed by none in its accessibility and direct usefulness as a working and reference library. In addition to the books, portfolios, pamphlets, etc., there are several thousand choice photographs covering the entire field of architecture, about one thousand fine color reproductions of the masterpieces of painting, some nine thousand carefully selected lantern slides, and many original drawings made by masters of design and draftsmanship in architecture, all of which are directly accessible to the student.

All instruction is by direct and personal elbow-to-elbow discussion and criticism that gives to each pupil the utmost that his teachers and advisers have to give.

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